RESEARCH INTO PERSIAN GULF WAR VETERANS' ILLNESSES

HEARING

BEFORE THE

SUBCOMMITTEE ON NATIONAL SECURITY, VETERANS AFFAIRS AND INTERNATIONAL RELATIONS

OF THE

COMMITTEE ON GOVERNMENT REFORM

HOUSE OF REPRESENTATIVES

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RESEARCH INTO PERSIAN GULF WAR VETERANS' ILLNESSES

THURSDAY, OCTOBER 10, 2002

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON NATIONAL SECURITY, VETERANS AFFAIRS AND INTERNATIONAL RELATIONS,
COMMITTEE ON GOVERNMENT REFORM,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:35 a.m., in room 2247, Rayburn House Office Building, Hon. Christopher Shays (chairman of the subcommittee) presiding.

Present: Representatives Shays, Putnam, and Gilman.

Staff present: Lawrence J. Halloran, staff director and counsel; Kristine McElroy, professional staff member; Jason M. Chung, clerk; David Rapallo, minority counsel; and Teresa Coufal, minority staff assistant.

Mr. SHAYS. A quorum being present, the Subcommittee on National Security, Veterans Affairs and International Relations hearing entitled, "Research Into Persian Gulf War Veterans' Illnesses," is called to order.

My statement is that if we have to send American armed forces onto a potentially toxic battlefield in Iraq once again, the lessons of the last Gulf war cannot be left behind. The most important lesson is that diagnosis and treatment of the wounds inflicted by multiple exposures to chemicals, pathogens, toxins and medicines require an openness to new theories of causation and cure.

That openness, and the promising research hypotheses it spawns, have not always driven the Government-funded research portfolio. But privately supported studies have brought new insights into the mysteries of Gulf war syndromes.

In June, Mr. Sanders, Mr. Putnam and I participated in 2 days of extraordinary meetings in London on Gulf war veterans' illnesses. Lord Alfred Morris of Manchester, who participated in a subcommittee meeting here in January, invited us to meet with veterans, parliamentarians, and researchers from the United Kingdom. As in January, we were joined by Ross Perot, an outspoken and tireless advocate for Gulf war veterans.

Our meetings in London were memorable for two reasons. First, the U.K. veterans and surviving family members spoke with the same quiet, aching eloquence we have heard so often in this very room from their U.S. counterparts. They shared their sense of frustration and betrayal over a decade of official denials from both sides of the Atlantic about the role of wartime exposures in causing their illnesses.

Second, a panel of researchers, mostly privately funded, presented remarkable findings on subtle but objectively discernible brain cell damage resulting from toxic exposures. The damaged cells can send distorted chemical signals throughout the body, explaining the variety of symptoms and syndromes suffered by Gulf war veterans. We convene this hearing today to make that compelling personal testimony, and that important scientific data, a part of our official subcommittee record so all those interested in the welfare of Gulf war veterans can have access to this important information. We already made the transcript of the London meeting available to the Department of Veterans' Affairs Research Advisory Committee on Gulf War Veterans Illnesses.

[The prepared statement of Hon. Christopher Shays follows:]

Statement of Rep. Christopher Shays
October 10, 2001

If we have to send American armed forces onto a potentially toxic battlefield in Iraq once again, the lessons of the last Gulf War cannot be left behind. The most important lesson: Diagnosis and treatment of the wounds inflicted by multiple exposures to chemicals, pathogens, toxins and medicines require an openness to new theories of causation and cure.

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So I ask unanimous consent to include in the record of this hearing: the verbatim transcript of the meeting held June 18, 2002, at Portcullis House, House of Commons, London; the written statements of those who participated in the June 18 meeting; and a letter from James Binns, Chairman, VA Research Advisory Committee on Gulf War Veterans Illnesses Research dated October 7, 2002 accepting this material for review by that panel.

Without objection, so ordered.

Mr. SHAYS. So I ask unanimous consent to include in the record of this hearing, the verbatim transcript of the meeting held June 18, 2002, at Portcullis House, House of Commons, London; the written statements of those who participated in the June 18 meeting; and a letter from James Binns, chairman, VA Research Advisory Committee on Gulf War Veterans Illnesses Research dated October 7, 2002 accepting this material for review by that panel.

Without objection, so ordered.

[The information referred to follows:]

JAMES H. BINNS, JR.

October 7, 2002

Hon. Christopher Shays
Chairman
Subcommittee on National Security, Veterans Affairs,
And International Relations
Committee on Government Reform
United States House Of Representatives
2157 Rayburn House Office Building
Washington, D.C. 20515-6143

Dear Mr. Chairman,

Thank you for your invitation to inform the Subcommittee on National Security, Veterans Affairs, and International Relations on the activities to date of the Research Advisory Committee on Gulf War Veterans Illnesses.

Veterans Affairs Secretary Anthony J. Principi appointed the Committee in January, 2002. The Committee has held two meetings, on April 11-22, 2002, and June 25, 2002. Outside of these meetings, the Committee has reviewed a large body of existing research, including both government-sponsored research and over a thousand pages of other relevant research identified by members of the Committee.

The Committee issued its first report on June 25, 2002, with several recommendations. It noted that these recommendations were not intended to be comprehensive, but reflected the conclusions the Committee had arrived at thus far.

The recommendations focused on three major areas. First, the Committee emphasized the long overdue need to identify and develop treatments for Gulf War illnesses. This research would include monitoring clinical outcomes of treatments currently prescribed in VA medical centers, soliciting information on effective treatments from veterans and physicians both inside and outside the VA, and establishing small-scale pilot projects to evaluate promising treatments.

Second, the Committee focused on aggressively pursuing the newly-discovered evidence of neurological involvement, to better understand the disease mechanism, and ultimately lead to treatments. A likely mechanism to investigate is the effect of acetylcholinesterase inhibitors.

Third, in light of the opportunity to achieve a potential breakthrough in defeating Gulf War illness through neuroscience research, and the need to protect current American forces and

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civilians from similar threats in the war on terrorism, the Committee recommended a major increase in funding.

A copy of the Committee's full report and recommendations is attached.

Your Subcommittee staff requested that I review and comment on the Subcommittee hearings on Gulf War-related illnesses held in London, England on June 18, 2002. The testimony of veterans and scientists presented in London reflects many of the same comments that we are receiving here. Thousands of British Gulf War veterans are ill. They are frustrated with the lack of progress that has been made in diagnosing their health problems and identifying treatments.

As in the United States, British researchers are beginning to identify the causes and mechanisms responsible for Gulf War illnesses. The researchers prominently identified neurological damage, likely caused by acetylcholinesterase inhibitors, including organophosphate pesticides, nerve agents, and pyrodistigmine bromide pills. Multiple vaccines were also identified by the British as associated with higher disease levels and possible neurological injury. Depleted uranium was identified by the British as a risk for cancer.

As noted above, our Committee has found objective evidence of neurological injury in ill Gulf War veterans and identified acetylcholine inhibitors as a likely mechanism. The British research on farmers exposed to sheep dip, indicating that low-level exposures to organophosphates can cause long-term harm, is an extremely relevant body of science for our Committee to consider.

Our Committee has also identified vaccines as a priority area for investigation, but it has not made recommendations regarding vaccines or depleted uranium. An important conclusion shared by the British researchers and our Committee has been the insight that these findings are not inconsistent with one another. As our Committee name implies, there are very likely multiple Gulf War illnesses. However, it is increasingly evident that a major subset of illness is neurological.

On behalf of the Research Advisory Committee, I welcome the additional insights of the British researchers and will be pleased to share the hearings transcript with our Committee.

Respectfully submitted,

James H. Binns, Jr.
Chairman
Research Advisory Committee on Gulf War Veterans' Illnesses

June 25, 2002

Hon. Anthony J. Principi
Secretary of Veterans Affairs
Department of Veterans Affairs
810 Vermont Avenue, NW, Suite 1000
Washington, D.C. 20420

Dear Mr. Secretary,

On behalf of the Research Advisory Committee on Gulf War Veterans Illnesses, I am pleased to submit this interim report. This report focuses on fundamental findings appropriate to this initial stage of our work. We look forward to making more detailed recommendations later this year. Based on our review of federal government and other research done to date, we have reached the following conclusions and recommendations.

Respectfully submitted,

James H. Binns, Jr.
Chairman
Research Advisory Committee on Gulf War Veterans Illnesses

Research Advisory Committee on Gulf War Veterans Illnesses
Interim Report
June 25, 2002

A. Conclusions

1. Gulf War veterans are ill. (See Appendix A.)

   a. They suffer from a pattern of health problems that significantly exceeds those seen in comparable populations, beyond that which is explained by stress or psychiatric diagnoses.

   b. Different epidemiological studies consistently show 25-30% of the veterans who served in the Gulf are ill, over and above the control population chosen for each study.

2. It is increasingly evident that at least one important category of illness in Gulf War veterans is neurological in character, according to recent scientific studies. (See Appendix B.) While these studies are not conclusive, there is enough evidence at present to conclude that this line of inquiry represents a potential breakthrough that should be aggressively pursued.

   a. Magnetic resonance spectroscopy suggests a loss of neurons in selected brain areas in ill veterans, particularly in the basal ganglia and brainstem. The areas of neuronal deficiency relate to veterans' symptoms. Veterans with cognitive problems show neuronal loss in the basal ganglia; those with muscle and joint problems show loss in the brainstem.

   b. Heart rate measurements show dysregulation of the autonomic nervous system in ill veterans

   c. Gulf War veterans are suffering from ALS at approximately twice the expected rate.

   d. A substantial increase in the cold sensory threshold has been measured in ill Gulf War veterans.

   e. Audiovestibular tests show abnormalities of central vestibular function.

   f. Ill veterans show elevated brain dopamine production.

   g. Ill veterans have low levels of an enzyme, paraoxonase, that is involved in breaking down organophosphates, and are more likely to have genotypes poor at metabolizing certain organophosphates, suggesting biochemical and genetic explanations for why some veterans became ill and others in the

same location did not.

3. Many risk factors associated with Gulf War Illnesses are present today in Southwest Asia.

   a. Risk factors include exposures to environmental toxins, low-level nerve agents, depleted uranium, oil fires, mustard gas, stress, medical countermeasures to biowarfare and nerve agents, infectious diseases, and combinations of these factors.

   b. Several risk factors are also germane to domestic terrorism preparedness. Nerve agent exposure is a terrorist concern; and medical countermeasures for chem-bio warfare are relevant to homeland as well as military defense.

   c. Research on Gulf War Illnesses has broad implications to the war on terrorism.

B. Recommendations

1. Use all available methods to identify and evaluate treatments that may hold promise for the unexplained illnesses experienced by Gulf War veterans. Methods for evaluating potentially promising treatments should include, but not be limited to:

   a. Establish a program to monitor clinical outcomes associated with treatments recommended by current practice guidelines and/or commonly used by VA physicians to treat Gulf War veterans with unexplained illnesses;

   b. Establish pilot projects to evaluate existing claims regarding the effectiveness of treatments identified as effective for Gulf War illnesses;

   c. Solicit and investigate claims of treatment efficacy from clinicians and veterans;

   d. Collect data regarding specific treatments and lifestyle habits in existing and future projects that follow Gulf War veterans over time, and evaluate their associations with changes in veterans' health status.

2. Enlist the expertise of specialists in neurobiology and neurological illness in the national research effort on Gulf War Illnesses.

   a. This effort should include both individual experts from academia and the private sector as well as government agencies with relevant expertise like the National Institute of Neurological Diseases and Stroke and the Environmental Protection Agency.

   b. In addition to seeking advice, the research effort should seek the

participation of these individuals and agencies in promoting and funding high quality Gulf War Illnesses research.

3. Designate as a research priority the investigation of neurological mechanisms, including acetylcholine dysregulation and other acetylcholinesterase inhibitor-induced pathology, that potentially explain the disease process (in an important subset of ill veterans) and may lead to the development of treatments. (See Appendix C.)

   a. Immediately solicit and fund research proposals on this priority topic.

4. Establish a research program to identify objective markers in ill veterans or subsets of ill veterans, and to investigate linkages between markers, exposures, and health status. Such studies are capable of identifying distinct illness syndromes, with specific causes, natural histories, diagnostic approaches, and responses to treatments. Objective markers include those that can provide information on character of exposures, on character of illness, and on mechanisms of illness.

5. Make full use of existing data on veterans' health and treatments.

   a. Merge Department of Defense databases on veterans' locations and exposures with the Veterans Benefits Administration database on veterans' health claims and diagnoses; and with the Department of Defense's Comprehensive Clinical Evaluation Program database, the VA Gulf War Registry database, and data from the VA National Survey of Persian Gulf Veterans. Consider including relevant databases from other sources, such as the Social Security Administration's National Death Index and Social Security Verification.

6. Manage for results.

   a. Solving a complex medical research problem requires sound scientific management of the overall program as much as well-executed individual studies. It is not surprising that the existing management structure has not produced the desired results. After reviewing Gulf War illness and related research programs in 1999, the Institute of Medicine of the National Academy of Sciences concluded that while "[m]any excellent efforts have been fielded . . ., [t]hese research efforts have in large part, however, not been undertaken in response to a well-developed and coordinated research agenda."

   b. Create a single business plan to drive the research program, identifying objectives and milestones, revised at least annually, and approved by the Secretary of Veterans Affairs and the Secretary of Defense.

   c. Open all research solicitations to open competition, allowing external as well

as internal researchers to participate, as is presently done at the Department of Defense but not the Department of Veterans Affairs.

d. Make peer review practices more open on the model of NIH peer review practices. To ensure customer orientation, place veterans on peer review panels after receiving peer review training.

e. Place responsibility for the national research program in a central organization with the scientific expertise to manage it and the confidence and involvement of the veteran community. In 1999 the Institute of Medicine recommended that responsibility for research into veterans' illnesses and deployment health be placed in an organization "independent of governance by any single federal agency in order to foster scientific excellence and assure scientific and public accountability." (See Appendix D.)

f. Pending the establishment of this national program, direct the Research Advisory Committee to review and advise on current and future research solicitations extended by the federal government related to Gulf War Illnesses, and all research proposals submitted.

7. Increase funding.

a. The opportunity to achieve a potential breakthrough in defeating Gulf War Illnesses through neuroscience research, the potential contribution to defeating other neurological diseases like ALS, and the need to protect current American forces and civilians as well as treat veterans, merit an increase in funding from current levels.

b. An adequate funding commitment is important to attract the best minds to the problem.

c. Funding research to develop treatments would not only alleviate suffering but would likely be more cost-effective than continuing care for chronic and possibly worsening conditions.

d. Provided management reforms are made to ensure funds are effectively spent, commit $150 million in federal funding for each of the next three years (compared to $350 million spent to date, according to the Department of Defense). Consider increasing this amount if initial results warrant.

APPENDIX A: SUMMARY OF EPIDEMIOLOGICAL EVIDENCE

The Symptoms, Prevalence, and Existence of Gulf War Veterans' Illnesses: What Do We Know From Epidemiologic Research?

Prepared by Lea Steele, Ph.D.

Summary of Presentation to the Research Advisory Committee on Gulf War Veterans' Illnesses

U.S. Department of Veterans Affairs. April 11, 2002

The health problems reported by Gulf War veterans since the end of Desert Storm have posed a complex and often frustrating challenge for veterans who are ill, as well as for clinicians, researchers, and government agencies charged with understanding and addressing these conditions. Epidemiologic research, the study of patterns of health and disease in populations, is typically the first scientific approach taken in understanding unexplained health problems. Since the Gulf War, epidemiologic studies have investigated the health status of many different groups of Gulf War veterans, including veterans from different branches of service, veterans from different countries and states, and veterans who served in different areas of theater.[1-11] Despite the diversity of research approaches and groups studied, a number of common threads have emerged from these investigations, providing preliminary answers to key questions about the characteristics, prevalence, and existence of veterans' unexplained illnesses, as well as evidence regarding their association with service in the Gulf War.

Gulf Veterans Experience High Rates of Symptoms and Diagnosed Conditions

Epidemiologic studies comparing mortality and hospitalization rates between Gulf War veterans and era veterans who did not serve in the Persian Gulf region (non-Gulf veterans) have, overall, found few differences with respect to disease-related deaths and hospitalization rates.[12-16] It will be important to follow Gulf veterans for years to come in order to monitor deaths due to diseases with longer latency periods, such as cancer. But at this time, the observed similarities between Gulf and non-Gulf veterans in terms of mortality and hospitalizations stand in contrast to findings regarding a group of poorly understood health problems not generally associated with hospitalization or death.

The most prominent and consistent findings to emerge from population-based studies of Gulf War-era veterans are that Gulf veterans experience a wide range of symptoms at significantly higher rates than non-Gulf veterans, and that Gulf veterans in different studies report similar constellations of symptoms. Representative symptoms reported by Gulf and non-Gulf veterans in a survey of over 20,000 U.S. Gulf War-era veterans are shown in Table 1.

Table 1. Proportion of U.S. Gulf War-era Veterans Reporting Symptoms in a National Survey[9]

	Gulf War veterans	*Non-Gulf veterans*
Headache	54%	37%
Joint pain	45%	27%
Fatigue	38%	15%
Difficulty concentrating	35%	13%
Diarrhea	31%	15%
Skin rash	29%	13%
Shortness of breath	24%	11%
Dizziness	22%	10%

Note that these symptoms, individually, are not unique to Gulf War veterans, in that they are also experienced by veterans in the non-Gulf veteran comparison group. This is not surprising, since it has long been known that some level of symptomatology is found in any population group.[17,18] But Gulf War veterans report these symptoms in patterns that are distinct from other veterans and from the general population,[19,20] that is, they experience multiple different types of symptoms simultaneously, over a long period of time. For example, while anyone might have occasional headaches or digestive problems or joint pain, it is not uncommon for Gulf veterans to experience *severe* headaches and joint pain and chronic diarrhea all at the same time, perhaps in connection with dizziness, memory problems, fatigue, and skin rashes, and for these problems to have persisted over many years. So, while individual symptoms may not be uniquely associated with Gulf War service, the *pattern* of symptoms in Gulf War veterans is distinct, in terms of symptom frequency, severity, duration, and the occurrence of multiple symptom types together.[5,9,10]

In addition to undiagnosed symptoms, population-based studies have found that Gulf veterans report significantly higher rates of some types of diagnosed medical conditions than non-Gulf veterans. The Department of Veterans Affairs recently announced that Gulf veterans have been approximately twice as likely as non-Gulf veterans to develop a serious neurodegenerative disease, amyotrophic lateral sclerosis, in the years since the war.[21] In addition, studies have found that Gulf veterans report significantly higher rates of diagnosed respiratory conditions, migraines, skin conditions, gastrointestinal conditions, and some psychological conditions, than non-Gulf veterans.[9,10] However, Gulf veterans have not reported increases in most age-related chronic conditions such as cancer, heart disease, and diabetes.[9,10]

The Relationship of Veterans' Illnesses to Gulf War Service

In light of the large body of evidence demonstrating excess morbidity in Gulf War veterans, there is now general consensus among researchers and government officials

that a substantial number of Gulf War veterans are ill. However, reports from government review panels and researchers have suggested that these conditions may not result from experiences or exposures specific to the Gulf War.[22-24] Is there evidence that veterans' unexplained health problems are linked to their wartime service?

Many epidemiologic studies have identified significant associations between illness and a variety of exposures which veterans report experiencing during the Gulf War, including smoke from oil well fires, receipt of multiple vaccinations, heavy use of pesticides, hearing chemical alarms, ingestion of pyridostigmine bromide, and pesticide use.[3,6,25-30] These findings have been considered to be inconclusive, however, due to limitations in veterans' knowledge and recollection of what they might have been exposed to, and at what levels.

Additional evidence linking veterans' illnesses to their service in the Gulf War is provided in a study of Kansas veterans which found illness rates to be significantly associated with the locations in which veterans served during the war.[10] Gulf War illness rates were lowest (21%) in Gulf veterans who served primarily on board ship during the war, higher in veterans who served on land but remained in support areas (31%), and highest (42%) in veterans who entered Iraq or Kuwait, countries in which the ground war and all coalition air strikes took place. Illness rates also varied with the time periods veterans were present in theater, with lowest rates (9%) among veterans who departed the region before the start of the air war in January, 1991, and a substantially higher rate (25%) among veterans present during Desert Storm who left the region in March of 1991, within a month of the cease-fire. But the highest rate of illness (43%) was found in veterans who didn't leave until 4-5 months after the cease-fire, regardless of the total length of time they spent in theater.

The nonrandom distribution of illness in Kansas veterans (identified prior to any media reports linking illness to time and place), and the unexpectedly high illness rates in veterans who were present in theater months after the cease-fire provide strong evidence that veterans' illnesses are associated with events and exposures specific to the Gulf War, evidence that is independent of veterans' recollections concerning specific exposures.

Is Stress the Cause of Gulf War Illnesses?

Early reports suggested that the unexplained illnesses reported by Gulf War veterans were due to wartime stress.[22,31] As additional research has become available, however, it has become evident that the unexplained health problems reported by Gulf veterans cannot be adequately explained by deployment stress, wartime trauma, or psychiatric diagnoses such as post-traumatic stress disorder (PTSD).[23] This is not surprising, given the general circumstances of the Gulf War. The war was short, requiring only four days of ground combat to achieve a decisive victory. Casualties were very low, and the vast majority of veterans were never in combat areas[9,10] and did not witness any deaths.[9,25]

Of course, some individuals did experience traumatic events during the Gulf War, and may now experience psychological problems as a result. Data from multiple

sources, however, indicate that only a small fraction of veterans with health concerns since Desert Storm suffer from PTSD. The Department of Veterans Affairs has reported that PTSD accounts for less than 5% of the diagnoses made in veterans examined in their Gulf War registry.[32] Similarly, a RAND report commissioned by the Department of Defense to review the scientific evidence concerning stress and Gulf War illnesses[33] concluded that overall rates of PTSD are low in Gulf War veterans, and found little evidence linking stress to symptoms or physical disease (p.65).

Recent studies, using more sophisticated evaluation and analytic approaches, verify that Gulf veterans experience higher illness rates than non-Gulf veterans, even after controlling for the effects of wartime stressors and current psychiatric diagnoses.[27,34-36] A related observation comes from a large British study which found high rates of symptoms and symptom complexes in Gulf War veterans, but not in veterans who served in the Bosnian conflict, an indication that these conditions were the result of experiences specific to the Persian Gulf theater, and not a more generalized psychological reaction to the stress of deployment to war.[6]

How Many Veterans Are Affected by Gulf War-Related Health Problems?

The question of the number of veterans with unexplained health problems is of key importance to veterans, government officials, and healthcare providers. Although government and media reports often say that about 100,000 U.S. Gulf veterans (14%) are affected by Gulf War-related health problems, this number is not based on any research study. Research estimates of the proportion of veterans who are ill vary widely from study to study, depending on how the "Gulf War multisymptom illness" complex is defined (Table 2).

But a surprisingly consistent estimate of the excess rate of illness in Gulf veterans has emerged from several studies, using different definitions of "multisymptom illness," as shown in the right column of Table 2. This is important, since the prevalence in non-Gulf veterans provides an estimate of the rate of illness expected in the absence of service in the Gulf War, and the "excess" rate in Gulf veterans provides an indicator of illness resulting from Gulf War service.

Table 2. Prevalence Estimates of Multisymptom Illness in Gulf and non-Gulf Veterans

Group Studied	*Case Definition Used*	*Prevalence in Gulf Veterans*	*Prevalence in Non-Gulf Veterans*	*Excess in Gulf vs. Non-Gulf Veterans*
PA Nat'l Guard[5]	CDC Multisymptom	45%	15%	30%
U.K. veterans[6]	CDC (modified)	62%	36%	26%
Kansas veterans[10]	KS Gulf War Illness	34%	8%	26%
Kansas veterans[10]	CDC Multisymtom	47%	20%	27%

Regardless of whether the symptom pattern is defined broadly (as in the study of U.K. veterans), or conservatively (as in the study of Kansas veterans), the level of illness experienced by Gulf veterans in excess of the level in non-Gulf veterans is consistently between 26-30%, suggesting that 26-30% of Gulf veterans are affected by a complex of multiple symptoms in connection with their Gulf War service.

Summary of Epidemiologic Findings: What Do We Know?

Although many questions remain about the nature and causes of health problems affecting Gulf War veterans, a number of key conclusions can be drawn from existing epidemiologic research.

- Gulf War veterans are ill. They experience significantly more symptoms, illnesses, and diagnosed conditions than veterans who did not serve in the Gulf War.
- Gulf War veterans' illnesses are associated with their experiences during the war.
- Elevated illness rates observed in Gulf veterans are not explained by wartime stress or psychiatric diagnoses.
- Between 25 and 30 percent of Gulf War veterans are affected by multisymptom illnesses associated with their wartime service.
- The unexplained health problems affecting Gulf War veterans have generally not been associated with increases in disease-related mortality or hospitalization rates.

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APPENDIX B: SUMMARY OF NEUROLOGICAL FINDINGS

Prepared by Robert Haley, MD

Summary of Presentation to the Research Advisory Committee on Gulf War Veterans' Illnesses

U.S. Department of Veterans Affairs. April 11, 2002

I. Early Findings Suggesting a Possible Neurologic Syndrome

Evidence of a Gulf War Syndrome

In 1997 Haley, Kurt and Hom reported three primary syndrome-like symptom complexes identified by exploratory factor analysis of typical symptoms of Gulf War syndrome in a battalion of U.S. Naval Reserve construction troops.[1] Haley syndrome 1 comprised distractibility, forgetfulness, depression, and daytime somnolence, etc. ("impaired cognition"); syndrome 2, more profound reduced intellectual processing, confusion, frequent disorientation and episodes of vertigo ("confusion-ataxia"); and syndrome 3, chronic somatic pain and paresthesias of the extremities ("central pain"). These syndromic constructs were replicated by confirmatory factor analysis in which a model of simultaneous structural equations from the first study was demonstrated to fit well the symptom data of an independent sample of 335 regular U.S. Army veterans of the Gulf War.[2]

In a survey of over 20,000 from random samples of the deployed and nondeployed Gulf War-era veteran populations, Kang et al. of the VA Central Office performed an exploratory factor analysis and identified three syndrome factors closely resembling the three Haley syndrome factors and concluded that syndrome factor 2, found only in the deployed population, represented a "unique Gulf War syndrome." This study was presented as a poster and published as an abstract at the 1999 Conference on Federally Sponsored Research on Gulf War Illness[3] but has not been published in a peer-reviewed journal.

Recently, Cherry et al. reported the results of a survey in a random sample of deployed and nondeployed British Gulf War-era veterans in which exploratory factor analysis obtained syndrome factors named "psychological," "neurological" and "peripheral," among others, which appeared similar to the three Haley syndromes.[4]

Other research groups attempted to apply exploratory factor analysis to previously collected survey data with mixed results. Fukuda et al. of CDC identified two factors resembling Haley factors 1 and 3 but had not measured the symptoms to identify factor 2.[5,6] The surveys of Knoke et al.[7,8] and Doebbeling et al.[9,10] measured symptoms of common psychiatric diseases rather than those of Gulf War syndrome and consequently derived factors reflecting these extraneous conditions. Ismail et al., studying British Gulf War veterans, measured symptom sets too different to evaluate the Haley syndrome factors.[11,12] The conflicting findings from the studies that measured mostly common psychiatric and atypical symptoms have prevented a consensus on whether a neurologically based syndrome exists.

Studies of functional status and neuropsychological measures have also suggested neurologic involvement but have not been compelling.

Functional Status Measures

In their 1997 report Haley, Kurt and Hom reported that Gulf War veterans meeting their case definition of syndrome 2 ("confusion-ataxia"), but not those with the other two syndromes, were far more likely to be unemployed than the well veterans in the battalion.[1]

In a large random sample survey of Gulf War veterans from Iowa, the Gulf War veteran population as a whole scored 3-7 points lower (on a 100-point scale) on all measures of the MOS SF-36 test of functional status than the non-deployed veteran population.[13] Although these differences were statistically significant, they greatly underestimated the extent of impairment by combining the relatively small percentage of deployed veterans who are ill with the much larger number of deployed veterans who remained well.[10]

Recently, Haley, Maddrey and Gershenfeld addressed this problem by administering the MOS SF-36 to groups of ill Gulf War veterans fitting the Haley syndromes versus controls and found substantial functional impairment (40-60 points lower than well veterans) comparable to common disabling diseases including congestive heart failure, recent myocardial infarction, diabetes, and emphysema.[14]

Neuropsychological Tests

A large body of studies in the Gulf War illness literature have involved psychological and neuropsychological tests.[for example,15-19,19,20] The preponderance of findings indicate subtle deficits on a variety of measures in ill veterans compared with either deployed or nondeployed controls. Subtle neurocognitive deficits tend to be correlated with psychological measures of depression and somatic complaints, a pattern found commonly in both major depressive disorders and in neurologic disorders, and the various research groups disagree on the implications of this broad array of subtle abnormalities. Consequently, the contribution of neuropsychological testing to understanding the problem has been limited.

II. Objective Markers of Neurological Disease

A growing body of research, particularly within the past two years, provides objective evidence of neurological disease in Gulf War veterans.

Neurophysiological Tests

Cold Sensory Threshold. As early as 1996 Jamal et al. reported the results of neurophysiologic tests, including quantitative sensory tests, sensory and motor nerve conduction studies, visual, somatosensory and brainstem auditory evoked potentials, and electromyography in a pilot study including 14 Gulf War veterans with fatigue, weakness, paresthesias, numbness, temperature disturbances, and somatic pain, and 13 well civilian controls.[21] They found a substantial increase in the cold sensory threshold (cases 0.55 C°, controls 0.25 C°, $p < 0.0002$) but no difference in warm or vibratory thresholds and only marginally significant differences on 2 of 12 nerve conduction parameters.

Haley et al. recently replicated Jamal's finding of an increased cold threshold and the absence of abnormalities on the other neuromuscular tests in their series of cases and controls (unpublished data).

Audiovestibular Tests. In their 1997 report Haley et al. presented the results of audiovestibular tests that would be sensitive to subtle damage to brainstem reflex pathways.[22,23] Compared with the 23 age-sex-education-matched controls, the veterans with Haley syndromes 2 were significantly more likely to have pathologic nystagmus and abnormal ocular motility, and increased interocular asymmetry of saccadic velocity (eye reflexes), and to have significantly reduced saccadic velocity after caloric vestibular stimulation, increased intraocular asymmetry of gain on sinusoidal harmonic acceleration, and interside asymmetry of wave I-III latency on auditory brainstem evoked response. Syndromes 1 and 3 generally scored between the more nearly abnormal syndrome 2 patients and the controls. The investigators concluded that the findings were most compatible with a subtle abnormality of central vestibular function involving the vestibulo-ocular reflex mediated by neural pathways in the brainstem or basal ganglia.[23]

Autonomic Nervous System Function. Haley et al. recently completed a thorough evaluation of autonomic nervous system function, including 24-hour measurements of heart rate variability, blood pressure and body temperature, direct recording of sympathetic nerve activity in a peripheral nerve at rest and under orthostatic stress, tests of sudomotor function, sleep studies, etc., in 22 ill Gulf War veterans and 18 age-sex-education-matched control veterans from the same battalion. The report, presented at the 2000 Conference on Federally Sponsored Research on Gulf War Illness[24] and presently undergoing journal peer review, documents substantial blunting of the normal increase in high frequency heart rate variability during sleep, the most sensitive sign of early autonomic nervous system dysfunction. If accepted by journal peer review and more widely verified, this finding could explain common Gulf War symptoms such as the perception of poor sleep, morning fatigue, chronic pathogen-free diarrhea and the reported increase in cholecystitis and cholecystectomies in young male Gulf War veterans compared with other veterans.[25]

Neuroimaging Studies

Initial MR Spectroscopy Studies. In their initial 1997 nested case-control study, Haley et al. performed standard brain magnetic resonance imaging (MRI) and found no structural differences.[22] Noting the similarity of the symptoms of GW syndrome and the early presenting symptoms of primary diseases of basal ganglia, Huntington's, Wilson's and Fahr's diseases,[26] in a subsequent study they performed long echo time (TE=272) proton (^{1}H) magnetic resonance spectroscopy (MRS) of 4x2x2-cm single voxels in right and left basal ganglia (deep brain structures) and a 2x2x2-cm single voxel in the pons (brainstem).[27] The ratio of N-acetyl-aspartate to creatine (NAA/Cr), a non-specific measure of functional neuronal mass (brain cell health), was significantly lower in all three brain regions in the 22 ill Gulf War veterans than in the 18 age-sex-education-matched control veterans ($p = 0.007$). The NAA/Cr ratio was reduced in all three brain regions in the veterans with Haley syndrome 2 (for example, in the right basal ganglia, cases 3.60±0.11, controls 4.08 ± 0.13, a 12% difference, $p = 0.003$). The NAA/Cr ratio was marginally reduced only in both basal ganglia but not in the pons in syndrome 1, and only in the pons but not in the basal ganglia in syndrome 3. The NAA/Cr ratio was also lower in all three brain regions of 6 additional ill veterans with Haley syndrome 2, recruited from a new survey U.S. Army veterans in North Texas as a replication sample. The investigators concluded that Gulf War veterans with different clinical syndromes

have biochemical evidence of neuronal damage in different distributions in the basal ganglia and brainstem

Independent Replication. Following the initial report of the Haley et al. MRS finding at the 1999 Radiological Society of North America, Weiner and colleagues at the San Francisco VA Medical Center and UCSF Medical School undertook a study to test the finding in an independent group of veterans. In 11 ill Gulf War veterans fitting the definition of Haley syndrome 2 and 11 non-veteran controls, all without history of alcohol abuse, major depression or PTSD, the investigators performed a similar protocol of long echo time, proton MRS on the right basal ganglia, with additional methodologic refinements (e.g., MRI segmentation). The results showed a similar reduction in the NAA/Cr ratio (cases 3.62 ± 0.41, controls 4.06 ± 0.72, $p = 0.05$), not confounded by partial-volume effects.[28]

Neurohormonal Studies

Simultaneous with the neuroimaging study, the Haley group hospitalized the 23 ill Gulf War veterans and 20 controls in the General Clinical Research Center (GCRC) of UT Southwestern Medical Center for 6 days in a low-stress environment with a standardized high-salt, low tyrosine diet. At the end of the period, a venous blood sample was drawn at exactly 7:30 AM after a 14-hour overnight fast, and assays were run for homovanillic acid (HVA) and 3-methoxy-4-hydroxyphenlyglycol (MHPG). In the syndrome 2 veterans versus the controls the HVA/MHPG ratio, an index of central nervous system dopamine production rate, was found to have a strong inverse association with the NAA/Cr ratio of the left basal ganglia ($R2 = 0.56$, $p < 0.0001$) but not with that of the right basal ganglia or the pons, following the laterality of dopamine effects in striatal ablation studies in rodents.[29] Specifically, veterans with more brain cell damage in the left basal ganglia (lower NAA/Cr ratio) had higher brain dopamine production, a finding compatible with upregulation of dopamine receptors after damage to dopaminergic pathways in the basal ganglia. The investigators concluded that the finding supports the theory that Gulf War syndrome is a neurologic illness, in part related to injury to dopaminergic neurons in the basal ganglia.

Genetic Predisposition

Initial Genetic Studies. In their initial 1997 epidemiologic report, Haley and Kurt reported that all three Haley syndromes were strongly associated with risk factors for exposure to cholinesterase-inhibiting organophosphate or carbamate chemicals: namely, syndrome 1 was associated with organophosphate pesticides in flea collars (relative risk, RR, 8.2, $p = 0.001$.) ; syndrome 2, with apparent low-level nerve agent exposure (RR 7.8, $p < 0.0001$) and with advanced side effects of pyridostigmine bromide anti-nerve agent prophylactic medication (RR 32, $p < 0.0001$); and syndrome 3, with high-concentration DEET insect repellant, $p < 0.0001$) and with advanced side effects of pyridostigmine (RR 3.9, $p < 0.0001$).[30] The unpublished survey by Kang et al. found virtually the same association of syndrome 2 with low-level nerve agent exposure (RR 6.9, $p < 0.0001$).[3] Cherry et al. found days handling pesticides to be strongly associated with their "neurological" factor and with symptoms consistent with toxic neuropathy.[31]

From these epidemiologic findings, Haley, Billecke and La Du reasoned that, if Gulf War syndromes had been caused by exposure to cholinesterase-inhibiting

organophosphate and carbamate chemicals (e.g., chemical nerve agent, pesticides, and pyridostigmine), individuals born with lower blood levels of enzymes that inactivate these chemicals would have been more susceptible and thus would have been more likely to be injured by their exposures.[32] As part of the nested case-control study in the UT Southwestern GCRC, they obtained a venous blood sample for assay of plasma activity of butyrylcholinesterase (BChE) and the allozymes of paraoxonase/arylesterase, the two enzymes that inactivate organophosphates, and for genotypic determination for BChE variants and polymorphisms of the PON1 gene for paraoxonase/arylesterase (type Q vs type R). Compared with the 20 age-sex-education-matched control veterans, the 26 Gulf War veterans with Haley syndromes had much lower plasma levels of the type Q paraoxonase/arylesterase enzyme. The difference was greatest for Haley syndrome 2 and intermediate for syndromes 1 and 3, again reflecting the relative degrees of severity of the three syndromes. The cases and controls did not differ on the type R paraoxonase/arylesterase allozyme, total paraoxonase or BChE levels. Veterans in the lowest quartile of type Q activity were 9 times more likely to have syndrome 2 than those with higher levels ($p = 0.009$). Genotype (having the R allele) was also predictive (odds ratio 3.3, $p = 0.05$). The allozyme-specificity of the finding was important because the type Q allozyme has high hydrolytic activity against the organophosphate nerve agents sarin and soman but low activity against common pesticides such as parathion and malathion; whereas, the type R allozyme has the converse. Blood levels of paraoxonase/arylesterase allozymes remain unchanged throughout life; whereas, BChE levels may be reduced by organophosphate or carbamate chemical exposures. The investigators concluded that the findings further support the proposal that neurologic symptoms in some Gulf War veterans were caused by environmental chemical exposures.

Replication Studies. The plasma samples from the Haley, Billecke, La Du study were transferred to the laboratory of C. A. Broomfield in the Biochemical Pharmacology Branch, U.S. Army Medical Research Institute of Chemical Defense, Aberdeen Proving Ground, Maryland, where they were tested for enzymatic activity against sarin and soman chemical nerve agents. The purposes of the experiment were to determine if the type Q paraoxonase/arylesterase activity measured in the prior study actually reflected hydrolytic activity against the presumed cause of the Haley syndromes and to attempt to replicate the test results in an independent laboratory. The results demonstrated that the hydrolytic activity against sarin and soman was significantly lower in the Haley syndrome patients than in the controls just as in the prior study.[32]

Mackness et al. recently published a report from a privately funded study demonstrating that the total paraoxonase blood level of 152 ill Gulf War veterans was less than 50% that of 152 civilian controls (100.3 vs 215, $p < 0.0001$) but that the genotype did not differ significantly between the groups.[33]

Related Studies. Cherry, Mackness et al. recently reported reduced paraoxonase and R allele predominance in British sheep dippers with fatigue-cognitive-pain syndromes similar to Gulf War syndrome and chronic fatigue syndrome.[34] Japanese researchers have cited the racial predominance of the PON R allele and low type Q allozyme levels in Asians as a possible explanation for the high attack rate of the low level sarin exposures in the 1995 Aum Shinrichyo terrorist attacks in the Tokyo and Matsumoto subways.[35] The R allele predominance in the PON1 genotype has also been found to be associated (odds ratio, 1.6) with the development of Parkinson's

disease.[36]

III. Relationship Between Gulf War Syndrome and Neurodegenerative Diseases

The studies described above have raised questions of whether Gulf War veterans may be at higher risk of prematurely developing neurodegenerative diseases as a result of environmental exposures in the Gulf War.

Amyotrophic Lateral Sclerosis

VA researchers headed by Dr. Ronald Horner at Duke University and the Veterans Administration Hospital in Durham, North Carolina have completed an epidemiologic study of ALS demonstrating that Gulf War veterans were approximately twice as likely to contract ALS as Gulf War-era veterans who did not serve in the Gulf War. Although the report of these findings remains in journal peer review at present, the epidemiologic connection appears likely, and the Secretary of Veterans Affairs has approved service-connected benefits for Gulf War veterans with ALS. Exposure to organophosphates, a class of chemicals including pesticides and nerve gas to which soldiers were exposed in the Gulf War, is one of the risk factors for ALS that has been identified in previous epidemiologic studies.[37,38]

Parkinson's Disease

At present there is no definite evidence that Parkinson's disease is occurring at increased rates or at unusually early ages in Gulf War veterans; however, emerging threads of evidence suggest that such could occur. Several researchers have observed anecdotal cases of tremors or movement impairment, usually in the hands, in atypically young Gulf War veterans, who say that the problems began during or just after the war (unpublished data). As noted above, symptoms of Gulf War syndrome resemble those of the early presenting symptoms of primary degenerative diseases of basal ganglia, a brain region that is also affected in Parkinson's disease.[26,27] The genetic profile (low blood PON1 paraoxonase enzyme concentration and R allele predominance) found to be a risk factor for Gulf War syndrome[32] has also been found to predispose to Parkinson's disease.[36] Brain dopamine production, which is an important abnormality leading to Parkinson's disease, has also been found to be abnormal in Gulf War syndrome.[29]

Implications for Preventing Neurodegenerative Diseases

The possibility of links between Gulf War syndrome and the later development of neurodegerative diseases like ALS and Parkinson's disease increases the urgency of research to clarify these issues. Confirmation of such links would suggest a need to develop ways of screening veterans for susceptibility or early signs so that preventive strategies could be tried. Possible preventive strategies might include avoidance of further organophosphate exposures and administration of neuroprotective medications.

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APPENDIX C: EVIDENCE LINKING ACETYLCHOLINESTERASE INHIBITORS, AND ACETYLCHOLINE DYSFUNCTION, TO ILLNESS IN GULF WAR VETERANS

Beatrice A. Golomb, MD, PhD

Acetylcholinesterase inhibitors appear to be causally linked to illness in ill Gulf War veterans.

Acetylcholine dysregulation is a mechanism that may explain the disease process in one major form of Gulf War illness, whatever the cause of the dysregulation. The following summary of work submitted for publication by Golomb demonstrates that acetylcholine dysregulation and associated pathology can be caused by exposure to acetylcholinesterase inhibitors present in the Gulf War experience. Work of Dr. Hermona Soreq and colleagues has suggested that both acetylcholinesterase inhibitors and certain stressful exposures are related to acetylcholine dysregulation and associated pathology1, 2.

Acetylcholinesterase inhibitors are agents that block normal regulation of the nerve signaling chemical "acetylcholine", that is involved in regulation of muscle function, memory, sleep, pain, gastrointestinal function, skin function, and emotion. Acetylcholinesterase inhibitors include pyridostigmine bromide, a nerve agent pretreatment pill given to an estimated 250,000 Gulf War troops; organophosphate and carbamate pesticides, used to minimize insect-born illness; and organophosphate nerve agents, to which an estimated >100,000 troops were exposed following incidents such as the Khamisiyah ammunitions depot demolition.

Hill's criteria for causality are a set of criteria that are widely used to adjudicate the likelihood that an exposure is causally linked to an outcome. These criteria are applied in settings in which randomized trial data cannot be obtained. (In general, when it is thought that an exposure leads to harm, randomized trials cannot ethically be performed to evaluate that hypothesis.) Hill's criteria consists of 7 desiderata: the association (between the exposure and the outcome) should be strong; it should be consistent; the cause should precede the effect; there should be a biological gradient, or dose-response effect; the effect should be biologically plausible; there should be concordance with preexisting literature; and the effect should be, perhaps, specific (though the criterion of specificity is routinely violated, since many exposures cause more than one outcome).

Strong relations of acetylcholinesterase inhibitors to illness have been observed.

These relationships are consistent in that each class of cholinesterase inhibitor to which Gulf War veterans have been exposed appears to separately be linked to increased reporting of health symptoms.

The connection is temporally appropriate, in that exposure occurred prior to increased illness reporting.

A connection is biologically plausible, since

- Many distinct elements of acetylcholine regulation have been shown to be disrupted following exposure to acetylcholinesterase inhibitors, and some of these changes in regulation are long-lasting or permanent

- This might be expected to lead to dysfunction in the domains that acetylcholine is involved in regulating, namely cognition, muscle function, sleep, pain, skin function, and gastrointestinal function

- These are domains that figure prominently in complaints of ill Gulf War veterans.

The link is specific, in the sense that people given acetylcholinesterase inhibitors for treatment of medical conditions report side effects in domains that accord with domains of symptoms in ill Gulf War veterans, while persons with the same condition who are treated with unrelated agents report different classes of symptoms. Additionally, basic science research shows prominent regional localization of acetylcholinesterase inhibitor activity (and of certain types of acetylcholine receptors) to a brain region called the basal ganglia; while studies in ill Gulf War veterans suggest that regional alterations in brain activity may localize most prominently to the basal ganglia.

There is concordance with existing literature, in that similar findings of increased symptoms across many health domains have been reported in studies of persons exposed to acetylcholinesterase inhibitors through industrial and accidental exposures.

A particularly compelling line of inquiry, from the standpoint of causality, is evidence that ill veterans differ statistically from healthy veterans in both the prevalence of poor-metabolizing genetic variants of enzymes that break down certain acetylcholinesterase inhibitors; and in the activity level for such metabolizing enzymes. Because genetic and physiological differences in acetylcholinesterase inhibitor metabolizing enzymes are not subject to manipulation by subjects, concerns regarding self-report and recall bias are not germane (when health status is obtained without subject knowledge of their biochemical state); these findings are particularly difficult to explain through other than a causal mechanism.

These factors are such that acetylcholinesterase inhibitor exposure appears to be causally linked to illness in Gulf War veterans.

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APPENDIX D: INSTITUTE OF MEDICINE 1999 REPORT

In 1999 the Institute of Medicine recommended the creation of a National Center for Military Deployment Health Research, whose "oversight ... would include representatives of the VA and DoD, while ensuring that the center would be an independent as possible from direct control by these agencies." The recommendation further included "the participation of a broad set of constituencies, including veterans groups and the general public, on the Governing Board."

The IOM report recommended locating the Center within the Military and Veterans Health Coordination Board. Since that Board has been disbanded, an alternate location would need to be identified.

The Executive Summary of the Institute of Medicine study follows.

The full study can be found at www.nap.edu/html/military_deployment/center.pdf.

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National Center for
Military Deployment Health Research

Lyla M. Hernandez, Catharyn T. Liverman, and Merwyn R. Greenlick, *Editors*

Committee on a National Center on
War-Related Illnesses and Postdeployment Health Issues
Division of Health Promotion and Disease Prevention

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Executive Summary

Concerns about the health of veterans of recent military conflicts have given rise to broader questions regarding the health consequences of service in any major military engagement. The Veterans Program Enhancement Act of 1998 directed the Secretary of Veterans Affairs to enter into an agreement with the National Academy of Sciences to help develop a plan for establishing a national center (or centers) for the study of war-related illnesses and postdeployment health issues. In response to this legislation, the Department of Veterans Affairs (VA) asked the Institute of Medicine (IOM) to convene a committee of experts. The charge to the committee was to (1) assist the VA in developing a plan for establishing a national center (or centers) for the study of war-related illnesses and postdeployment health issues, and (2) assess preliminary VA plans and make recommendations regarding such efforts.

The IOM convened the Committee on a National Center on War-Related Illnesses and Postdeployment Health Issues, composed of experts on war-related illnesses, clinical research, military medicine, epidemiology, health services research, operations research, development of interdisciplinary research centers, research ethics, technology transfer, and the integration of clinical and education programs with research. Between January and September 1999, the committee met three times. The first meeting included a workshop that was held to obtain background information on relevant issues. During subsequent meetings, the committee reviewed information on war-related illnesses and relevant research activities, analyzed alternative models for national research centers, and received testimony from veterans about their views for such a center. Additionally, the committee examined the VA's proposal for developing a national center program within the VA.

The committee conducted its deliberations with an understanding that the nature of military engagement has changed. Contemporary military conflicts depend on the availability of smaller expeditionary forces that maintain a high level of military readiness. This greater reliance on readily deployable forces includes increased participation by guard and reserve members. Both active- duty, guard, and reserve forces experience profound life disruptions connected to all phases of deployment that, despite the relatively rapid and short-term experience, may have long-standing health consequences. Additionally, there is a component of deployed civilian workers who are similarly impacted by military deployment. The committee found that:

- Extensive research exists on the health of veterans of military conflict.
- The definition of deployment-related health issues selected for research has been too narrowly focused and has excluded some health consequences related to deployment.
- There are gaps in the emerging data relevant to the study of war-related illnesses and postdeployment health issues.
- Many investigations of health issues and effects of deployment have been mounted in response to health problems after they occurred, rather than being undertaken proactively.
- Many veterans and some congressional staff are skeptical of the objectivity of both the Department of Defense (DoD) and the VA in the conduct of research into deployment-related health issues.
- None of the locations of existing or proposed centers provides an adequate model for a national center that not only must be responsible for the conduct of a broad range of research but also must provide for synthesis and coordination of

research efforts and for proposing policy changes based on research findings.
- Examples exist of centers that cut across agencies and groups to carry out effective research agendas.

VA PROPOSAL

One component of the committee's charge was to review the VA's proposal to establish Centers for the Study of War-Related Illnesses and Postdeployment Health Issues by using the model of the Geriatric Research, Education, and Clinical Centers (GRECCs). The GRECC program has been successful in training health professionals, conducting cutting-edge research, and implementing effective treatment programs. Creating centers based on this model for the study of deployment-related health should contribute greatly to the advancement of knowledge in this area. Therefore, the committee recommends that the Department of Veterans Affairs proceed with its proposal to establish centers for the study of war-related illnesses, and that these centers be similar in structure to the Geriatric Research, Education, and Clinical Centers.

NATIONAL CENTER

The second component of the committee's charge was to make recommendations regarding a national center. The committee concluded that a national center could provide the needed mechanism to coordinate and synthesize the ongoing research efforts. Such a center would be in a position to provide an overarching research agenda that would identify gaps in current research, to coordinate existing and future research, to focus the infusion of new research funding, and to recommend policies related to such research. Therefore, the committee recommends that Congress establish a National Center for Military Deployment Health Research that will focus on the health of active, reserve, and guard forces, and veterans and their families.

Location of the National Center

Despite the anticipated contributions of the VA centers, location within the VA carries with it limitations for a national center that is responsible for coordinating and synthesizing research across federal agencies and in university-based settings. The committee examined a number of options for the location of the National Center and concluded that it should be independent of governance by any single federal agency in order to foster scientific excellence and assure scientific and public accountability. Therefore, the committee recommends that the National Center be placed under the auspices of and report to the Military and Veterans Health Coordinating Board (MVHCB). Further, the committee recommends that the National Center replace the Research Working Group of the MVHCB.

The MVHCB was established by Presidential Review Directive and is chaired by the secretaries of the Department of Defense, the Department of Veterans Affairs, and the Department of Health and Human Services. It is charged with providing "oversight, coordination, and linkages to other related efforts in the Federal Government in the areas of deployment health, health care, research, health risk communication and education, record keeping, and compensation." The MVHCB has a broader mission than is found in any single federal agency and has been mandated to foster collaborative effort.

The Research Working Group (RWG) of the MVHCB has been charged with providing recommendations and coordinating research activities on deployment health issues affecting active-duty members of the armed forces, veterans, and deployed civilians, as well as the families of these individuals; preventing unnecessary duplication of research and assuring that resources are directed toward high-priority studies; and with acting as a forum for information exchange within the research community at large and for research coordination among the three participating departments. Since the proposed National Center for Military Deployment Health Research will encompass all aspects of the Research Working Group's mission, the committee suggests that the new Center replace the RWG, rather than duplicate its efforts.

The committee envisions three key structural components for the National Center. These components are:

- a Governing Board, composed of members of relevant constituencies, with responsibility for coordination and agenda-setting, as well as for oversight of the work of the Center;
- a Research Network that integrates research efforts in DoD, VA, HHS, universities, and other sites; and
- a core of specific functions, with appropriate staff to implement such functions, under the overall direction of the Center's board and the MVHCB director.

To assure the public, Congress, the scientific community, and others that all efforts of the Center are being conducted with the highest scientific integrity and public accountability, oversight of the Center should be by a Governing Board composed of representatives from a broad range of relevant constituencies.

Therefore, the committee recommends that the National Center Governing Board be composed of:

- three representatives each from VA, DoD, and HHS;
- six independent representatives from the research community; and
- six representatives from the community at large, including veterans and their families and the general public.

Additionally, the committee recommends that an independent scientific entity nominate, for both the research-community and the community-at- large positions, twice the number of candidates as there are positions available.

The committee recommends that the functions of the Governing Board include:

- development of a coordinated research agenda;
- commissioning of new research;
- creation of policies for the conduct and dissemination of Center re- search;
- evaluation of the output and productivity of Center research;
- development of policy recommendations that emerge from Center research;
- development of the Center's proposed annual budget; and
- preparation and transmittal to Congress of an annual report.

The committee has designed the research network of the National Center with two major components: (1) federal research programs and (2) Centerinitiated research. This structure provides minimum disruption to the ongoing research activities while adding a needed mechanism for research priority- setting and coordination, for dissemination of research results, and for undertaking tasks most appropriate for a central organization. Therefore, the commit- tee recommends a broad-based Center-initiated research program that would solicit proposals from federal agencies, universities, and other research sites and that would be managed by the National Center.

Center-initiated research should be implemented through the announcement of a set of Requests for Applications (RFAs) and Requests for Proposals (RFPs). It is suggested that the National Center enter into an agreement with the National Institutes of Health (NIH) to use the NIH peer-review process, to the extent possible, to assess the scientific merit of the applications and proposals. The final research funding decisions remain, however, the prerogative of the Center's Governing Board.

The committee recommends that the National Center be responsible for the four core activities:

- research coordination and priority setting;
- research-related policy analysis;
- review and analysis of longitudinal monitoring of deployment-related health; and
- facilitating the use of national data sources for deployment health re- search.

To foster research coordination and priority-setting, the Center should sponsor conferences and workshops to gather input for the research agenda and to encourage collaborative exchange. To increase scientific input in the development of the research agenda, the Governing Board may establish advisory groups or use other mechanisms to receive technical advice. It is anticipated that as the Center grows, so will its need for additional mechanisms to accomplish its activities. Rather than attempt to dictate those mechanisms, however, the committee believes it is important to allow the Board and staff to devise their own creative responses to their future needs.

Developing policy recommendations based on research results requires the synthesis and analysis of relevant research. Some of the same mechanisms described above for use in agenda-setting can be employed in policy analysis.

The committee identified the need for a mechanism to monitor the longitudinal health of active-duty, reserve, and guard forces that goes beyond the self-selected service members who participate in DoD and VA registries. A recently released IOM report (IOM, 1999) describes a research portfolio and longitudinal cohort study that could provide a model for a long-term tracking system of the health of veterans of military conflict. It is appropriate that the research described in that report fall within the purview of the National Center and become a cornerstone for its longitudinal monitoring efforts.

Given the numerous and varied data relevant to research on deploymentrelated health, the National Center should develop a process by which these data can be identified, inventoried, and described. Such activity will foster the effective use of these data.

Funding the National Center

The research issues involved in deployment-related health are complex and require long-term commitment if productive results are to be achieved. Significant funding resources will be needed for the National Center core activities, Governing Board, and Center-initiated research. The Center should propose a budget detailing the resources needed, and this budget should be a line item in the budget of the MVHCB. The Center should include such budget information in its annual report to Congress in order to

provide that body with information about the functioning and productivity of the Center. Therefore, the committee recommends that the National Center should have a clear and distinct budget for its core activities and its Center-initiated research. Further, this budget should be a line item in the budget of the MVHCB.

CONCLUSION

Many have begun to ask whether there are health consequences of service in military conflicts beyond the obvious war injuries and, if so, whether there are ways to prevent or at least mitigate the consequences of war-related illnesses and deployment-related health effects. Congress directed that the Department of Veterans Affairs contract with the National Academy of Sciences to assist in developing plans for a national center (or centers) for the study of war-related illnesses and postdeployment health issues that could focus research on answering these questions.

The committee has recommended the establishment of a National Center for Military Deployment Health Research, to be governed by an independent board composed of representatives of the scientific community, the veterans' community, and relevant federal agencies. Such a center would provide an opportunity to gather together the results of many individual efforts, to analyze and synthesize what this research can reveal, and to move the nation forward in ways that will help and protect those individuals who will participate in future deployments.

The committee urges that the recommendations in this report be implemented as rapidly as possible in order to gain much-needed knowledge about how best to protect and treat the men and women who participate in military deployments.

[The referenced transcript from June 18, 2002 follows:]

Mr. SHAYS. My Lords, Ladies and Gentlemen, Lord Morris of Manchester.

Lord MORRIS. Congressman Shays, this is a moment to savor. I speak as a parliamentarian here at Westminster for the last 38 years and I now invite you to proceed with and preside over the first ever Congressional hearing to be held in the British parliament. In doing so, I also welcome to London your distinguished Congress colleagues. Congressman Bernie Sanders and Adam Putnam are parliamentarians held in high regard in your country and with you they are most warmly welcome here at Westminster.

I welcome also this morning the visit to the UK of Ross Perot whose humane concern for Gulf Veterans now in broken health and the bereaved families of those who gave their lives in liberating Kuwait is rightly honored by the ex-service communities both here and in the United States. His dash and dedication as a campaigner is an important resource for both of us.

Christopher, the US and British troops fought side by side in the war to liberate Kuwait. So, it is entirely appropriate for the representatives of our two countries to work as closely as possible to give a parliamentary attachment to the problems of the Gulf Veterans with illnesses and the dependents of those who died since the conflict. Of all the duties it falls to parliamentarians to discharge, there is no more compelling priority than to act justly towards those who are prepared to lay down their lives for their country and the dependents of those who did so. There was no delay in the response of our troops to the call of duty in 1990, 1991; nor should there be any further delay now in discharging in full our debt of honor to them. That is much the best way, better than praise, than showing our regard in admiration of the men and women who served in the Gulf War.

Congressman Shays, you did me the honor and also my good friend and colleague Bruce George as Chairman of the Commons Defence Committee of inviting us to join you on the dais on equal terms for the last meeting of your congressional committee inquiry into Gulf War illnesses. I take pride in joining you again today and to know Bruce George would again have been with me but for a previous commitment he is honor-bound to discharge. He and I wish you God speed in all these proceedings at this historic hearing today. Congressman Shays.

Mr. SHAYS. Thank you, Lord Morris. It is indeed a tremendous opportunity and privilege for me and my colleagues to be with you today in what we call an investigative panel and not to be technical with our rules in Congress we are not swearing our witnesses in today since we are overseas. We are on a fact-finding mission, this is an investigative panel, probably one of the first and it is wonderful to have the courtesy extended to us that you have extended.

My colleagues, Congressman Bernie Sanders of Vermont on my left and Adam Putnam of Florida on my right and I deeply appreciate the opportunity to be with you here today. Our purpose is to continue an important dialogue about Gulf War veterans' illnesses with our friends here in Britain. Last January we invited the Chairman of the Commons Defence Committee, Mr. Bruce George and Lord Morris to sit with us in Washington as our subcommittee pursued its longstanding investigation into the status and prospects of research into the mysterious clusters of symptoms called Gulf War Syndrome. They suggested, and we immediately agreed, our inquiries into the health of coalition forces would be helped by hearing from veterans and health researchers in the UK. So we convened this investigative panel in the hope today we can ease the pain and improve the prognosis of US and UK veterans wounded more than a decade ago.

The Scottish scientist, Sir James Dewar observed: "Minds, like parachutes, work only when open." Then, sadly, too many minds on both sides of the Atlantic have been closed to the evolving sciences of environmental toxicology and multiple chemical sensitivities. These and other emerging fields of study hold the promise of answers to nagging questions of chronic ill-health suffered by many Gulf War veterans. These questions need to be pursued more openly and more vigorously.

It is of little scientific relevance and of no comfort whatsoever, to note outbreaks of mysterious, putatively stress-mediated diseases have followed all modern wars. That sad fact only proves one side was too blinded by victory to see the true costs of war, the other too vanquished to do anything about it. It is time to break that tragic cycle of myopic insensitivity—and I stress the word insensitivity.

Winston Churchill said, "It is no use saying 'We are doing our best.' You have got to succeed in doing what is necessary." Today we ask: What is necessary at this

juncture to advance productive research? Accurate diagnosis, effective treatment and fair compensation for sick Gulf War veterans. Our witnesses today will help us answer that important question. We look forward to their statements and to the opportunity to take advantage of their experiences, their insights and their considerable expertise.

[The statement of Mr. Shays follows:]

Statement of Rep. Christopher Shays
June 18, 2002

Good morning. Let me first thank our hosts in the House of Commons for allowing us to use this beautiful new hearing facility. My colleagues Congressman Bernie Sanders of Vermont and Congressman Adam Putnam of Florida deeply appreciate the opportunity to be with you here today.

Our purpose is to continue an important dialogue about Gulf War veterans' illnesses. Last January, we invited the Chairman of the Commons Defence Committee, Mr. Bruce George, and Lord Morris to sit with us as the Subcommittee pursued our longstanding investigation into the status and prospects of research into the mysterious clusters of symptoms called "Gulf War Syndrome." They suggested, and we immediately agreed, our inquiries into the health of coalition forces would be aided by hearing from veterans, parliamentarians and researchers in the United Kingdom. So we convene this session in the hope that together we can ease the pain and improve the prognosis of U.S. and U.K. veterans wounded more than a decade ago.

The Scottish scientist, Sir James Dewar, observed, "Minds, like parachutes, work only when open." Sadly, too many minds on both sides of the Atlantic have been closed to the evolving sciences of environmental toxicology and multiple chemical sensitivities. These and other emerging fields of study hold the promise of answers to nagging questions of chronic ill-health suffered by many Gulf War veterans. They need to be pursued more openly and more vigorously.

It is of little scientific relevance, and of no comfort whatsoever, to note outbreaks of mysterious, putatively stress-mediated diseases have followed all modern wars. That sad fact only proves one side was too blinded by victory to see the true costs of war; the other too vanquished to do anything about it. It is time to break that tragic cycle of myopia and insensitivity.

Winston Churchill said, "It is no use saying 'We are doing our best.' You have got to succeed in doing what is necessary." What is necessary at this juncture to advance productive research, accurate diagnosis, effective treatment and fair compensation for sick Gulf War veterans?

Our witnesses today will help us answer that important question. We look forward to their statements, and to the opportunity to take advantage of their experiences, their insights and their considerable expertise.

My colleagues and I want to thank all our witnesses and guest for joining us today.

Mr. SHAYS. My colleagues and I want to thank all our witnesses and guests for joining us today. We sincerely are very grateful to you. I will introduce our panelists in a second but I would welcome an opening statement from Bernie Sanders.

Mr. SANDERS. Thank you very much, Chairman Shays and thank you very much for the work you have led us on over the last many, many years in taking on an establishment which for whatever reason has chosen not to see the truth in the suffering of so many soldiers in the US and the UK and, Lord Morris, I thank you very much for your involvement in this country.

I would make a few points: It boggles my mind why in the US and perhaps in this country as well, men and women who have served their country, put their lives on the line, have been treated in the rather shameful manner in which they have been treated. Unfortunately, the history of how we treat veterans after they come home from war, whether it is radiation illness in World War II or Asian Orange in Vietnam, suggests there is something very, very wrong in how we thank the veterans who have served our country.

Some very simple issues have to be addressed. In the US, with which we are more familiar, 700,000 men and women went to the Persian Gulf. They were people who were in good health, else they would not have been in the military and gone overseas. Today, approximately 125,000 out of those 700,000 men and women are suffering one or another symptom of Gulf War illness and what we have got to determine is whether in the US there are 125,000 people who are malingerers, who are liars, who are suffering from mass hysteria or are there 125,000 people who are ill. In my view and I think I speak for our whole Committee, there are 125,000 people who are ill and at least 5,000 here in the UK.

Everybody who has studied the issue understands that the Gulf War was a chemical cesspool, that the men and women who were over there were exposed to all kinds of toxins and that in addition to that many of them took anti-nerve gas agents in the US, pyridostigmine bromide and in addition to that took vaccines for anthrax.

The good news is—to the degree there is any good news—that there are some significant scientific breakthroughs taking place in research and we will hear from Dr. Haley and others tomorrow and for the first time in the US what we call ALS, what you call Motor Neurons Disease has been recognized by the US government and is compensable in terms of compensation from the government for those men and women who served in the Gulf because it turns out at the very least the likelihood is twice as great for those people who went to the Gulf coming down with ALS as those who did not. That is the first acknowledgement on the part of the US government although I strongly expect there will be more to come in the near future.

So I want to welcome and thank very much all of our guests here, our friends in the UK for the work they have done and together we are going to find the cause of Gulf War illness and do everything we can, not only to get our veterans whole again but to increase the contact that exists in the civilian societies and the Gulf War veterans.

Mr. SHAYS. Thank you very much. Mr. Putnam, who is the Vice Chairman of our Committee.

Mr. PUTNAM. Thank you very much. As a freshman in Congress I am a newcomer to this fight that the Chairman and Mr. Sanders have carried on virtually since the day the troops returned home from the Gulf War. As the youngest member of Congress, it strikes me this is something of a generational issue, where we send our brightest and our best and youngest in society to go off and protect the freedom and liberties we all hold dear. It becomes very difficult to persuade them that those things are the right and proper tasks to take on when the government refuses to care for them after they come home, broken, battered, bruised and suffering.

The purpose of this hearing and this effort in addition to keeping our promise to making them whole is to refocus the attention on Gulf War protection. Surely there have been lessons leaned since the first Gulf War that we can apply to the young men and women serving in Afghanistan today and sooner or later will be asked with great likelihood to return to Iraq. What have we learned about war protection? What do we know today that we did not know ten years ago about chemical and biological weapons? How have we interacted with our allies to produce better vaccines, better treatment for the various risks that all veterans face and the answer to that thus far has been: Nothing. We have learned virtually nothing that has changed the way we protect our soldiers, sailors, young men and women we ask to go over and sacrifice so much.

So, I look forward to this hearing to collaborate with our tremendous friends here in the UK who jointly sacrificed with our nation, who jointly sent very young men and women to defend our civilization and who jointly have an obligation to care for them when they return, because when the ticker tape is swept up and the parades have ended, the costs, the obligations, the responsibilities to those veterans have not

ended and I look forward to working with Lord Morris and the Chairman and working towards a resolution of our government to caring for our veterans. Thank you, Mr. Chairman.

Mr. SHAYS. Thank you, Mr. Putnam. Let me say we have four panels. What we do back home in the US is that we invite our panelists to speak for five minutes. We are allowed to go over another five minutes and look at you in a sterner way. We do not have our typical clock which goes green, yellow, red. I am going to ask my staff to advise me of the time but we would clearly like you to be somewhere around five minutes, but if you go over a number of minutes your testimony it is so important to us that we would like to hear it, but in ten minutes I will stand up and create a scene.

[Laughter.]

[Mr. Perot enters.]

Mr. SHAYS. I am going to say, Ross Perot, we are going to invite you to sit on this Panel and I am going to explain to our audience when he gets back—if you are willing to be under my leadership and control, Mr. Perot, I have given a statement as well as Adam Putnam and Bernie Sanders and I would welcome you to give in two, three or four minutes a statement to the group that is here and you will be last on the list of questions since you have no elective role here but as someone—and let me say to our audience, Mr. Perot has been a champion in helping us break through the traditional approach of the government and medical community that has not wanted to look at Gulf War syndrome with the seriousness it deserves. When others have tried to use the medical community to demonstrate why our Gulf War veterans are not sick and not in need of attention and care, he has taken these matters up and made all the difference.

Ross, I would explain this is technically not a legal hearing of the US. It is an inquiry by an investigative panel. We are not taking sworn evidence from our witnesses, but we will take the entire record. We only have one day. I am going to watch her [indicating court reporter] carefully and make sure she is okay. We will read into the record and have the same impact as if you were here. So, Mr. Perot, we welcome you.

Mr. PEROT. Let me make it very clear, this is not stress. This is troops in combat, wounded by chemical agents. Our enemies and in this current war on terrorism, have these chemical agents. One of these is Iraq. We know they have these chemical agents. In the war on terrorism we just had another instance today of car bombers. Think of the same people spreading chemical agents across the waters. That can easily be done. We do not know how to vaccinate people and to protect them from it now and we do not know how to treat them after they have been injected. These issues should investigated 24 hours a day, seven days a week to develop these technologies and we can and I am sure we will, because it has gone far beyond all the troops now and to the entire population where literally millions of people can be impacted and the sooner we start, the sooner we will have the answer.

So, I hope that we will follow Winston Churchill's words, "We need action this day."

Mr. SHAYS. Thank you, Mr. Perot. I will introduce the panel. If I do not say it correctly, you correct me. Larry Cammock is Chairman of The Royal British Legion Gulf War Branch and Gulf Veterans Association. Shaun Rusling, Chairman of the National Gulf Veterans and Families Association. Samantha Thompson, widow of Gulf War veteran, Nigel Thompson who died of Motor Neurons Disease in January, 2002. We welcome you here today, Ma'am. John Nichol, former RAF Flight Lieutenant Navigator, shot down and captured by the Iraqis during the Gulf War. We are delighted to have all four of you, we will start with you, Mr. Cammock and we look forward to hearing your testimony. At the back of the room, if you cannot hear, I want to know that. Mr. Cammock, you have the floor.

STATEMENT OF LARRY CAMMOCK, CHAIRMAN, THE ROYAL BRITISH LEGION, GULF WAR BRANCH, AND GULF VETERANS ASSOCIATION; SHAUN RUSLING, CHAIRMAN, NATIONAL GULF VETERANS AND FAMILIES ASSOCIATION; SAMANTHA THOMPSON, WIDOW OF GULF WAR VETERAN NIGEL THOMPSON; AND JOHN NICHOL, FORMER RAF FLIGHT LIEUTENANT NAVIGATOR

STATEMENT OF LARRY CAMMOCK

Mr. CAMMOCK. I am Chairman of the Gulf Veterans Association and Chairman of the Royal British Legion Gulf Veterans Branch. I would like to thank you for in-

viting me to attend this meeting and allowing me to present information for consideration by the Committee. It is now 11 years since veterans like myself came home from the Gulf War and first started to experience the symptoms that are now called Gulf War Syndrome.

In the first two years the symptoms quickly progressed amongst veterans both here and in the United States. The death toll kept rising in both countries. Denial has been the key word and epidemiological studies the road to follow with the direction focusing on psychological conditions. We have in the UK over 5,000 veterans in receipt of a war pension for their conditions, which they first suffered from on their return from the gulf. To date there are 539 veterans who have died from their conditions or from links to their conditions.

Gulf veterans would like a public inquiry to take place and hopefully find the answers to the many questions that have been asked of the Ministry of Defence. The veterans associations, the Royal British Legion and individuals have asked these questions. They have to date been given non-answers such as "We are investigating the full issue of gulf illness" and "Gulf War Syndrome does not exist."

There has been a distinct lack of funds, which would enable the establishment of diagnostic protocols and treatments for each veteran. This responsibility the veterans feel lies with the Government. They should take care of their ex-service personnel. The lesson of the last 11 years is that more could and should have been done for this serious issue.

[The statement of Mr. Cammock follows:]

STATEMENT OF LARRY CAMMOCK
CHAIRMAN, GULF VETERANS BRANCH
THE ROYAL BRITISH LEGION
AND CHAIRMAN, GULF VETERANS ASSOCIATION

18 JUNE 2002

Mr. Chairman and Members of the Subcommittee on National Security, Veterans Affairs and International Relations. I would like to thank you for conducting this hearing regarding the health of British Gulf War Veterans and their families.

Two fellow veterans and I first spoke to your committee in Washington DC in November 1997. We have spoken to the Institute of Medicine in September 1999 and worked closely with the National Gulf War Resource Centre based in Washington DC. Since our formation in 1994 the Gulf Veterans Association has grown to over 2,500 members including ex-service and civilians who were attached to the armed services during and after the war.

In the beginning most of the veterans contacting the GVA were reservist and Territorial personnel who found that on return to their normal field of employment were having difficulty with memory and fatigue and aching joints. In some cases their employment was terminated due to persistent ill health. It soon became apparent that there was a pattern of illness spread through the reserve forces that were mainly employed during the war in the medical field.

The Association was formed and an open meeting was arranged where over 500 veterans attended all complaining of similar illnesses. Regional Members of Parliament who took part in the meeting were astonished at the condition of some of the veterans they saw that day and the range of symptoms that they suffered from. Shortly after, the Ministry of Defence set up the Medical Assessment Programme and various ministry run epidemiological studies. Some of those research studies have still to be published. Those that have been published emphasise on the PTSD diagnosis. Those veterans who have been through the Medical Assessment Programme feel that they have been conned into thinking that once they have completed all the tests, x-rays and scans they would be treated for the symptoms they showed. But no treatments followed. Even those who had been diagnosed with psychological symptoms were not being adequately addressed. They were passed on to the National Health Service to look after. Because of this 98 veterans have since taken their lives.

We as an Association have met with Ministers of Defence, with ministerial staff and with medical doctors of the assessment programme. They all speak the same language. (There is nothing wrong, it's all psychological, and nothing went wrong out there). They tell us that most of the research is going to take a long time to find out results, a further five to seven years as in the research into the vaccines. They told the Association for years that depleted uranium is not a problem, though there is documentary evidence to the effect it

is. Now they are going to set-up a research programme to investigate and report any findings. This all takes time. Time that is something the veterans of this Association do not have due to their illnesses. Whatever length of time they do have they would like to spend with a quality of life they deserve. As a responsible caring veterans group we have looked to other sources of research that is out of the military control and influence. However, this is difficult to establish. Two programmes were started. One based at Sunderland University Department of Autism and Dyslexia with Paul Shattock, who found a link with the dyslexia in gulf veterans.
The second study at the University Hospital Department of Medicine Manchester with Dr's M and B Mackness, this was a blood study looking at the enzyme paraoxonase. This study found in the initial research enough evidence linking the condition veterans suffered to the gulf. A second study was started to confirm and identify the damage. This study is due to be completed soon. On this second study the Ministry of Defence asked if they could supply blood samples via Kings College University Hospital of 400 veterans that had been seen by Kings College. Dr M Mackness agreed to examine the samples as well as the Association samples. Until recently all the effort that we have put into these studies taking place has been unacceptable to the Medical Assessment Programme. We have been accused of scare mongering and creating despondency amongst the veterans. What we do know is that our veterans are ill and the illness is not going to go away.

Each month we are receiving new members, veterans of all ranks who have recently left the service and are showing signs of illness and have done so during their service. In most cases their medical officers have told these veterans that it is mainly stress or their age that is causing problems. For those still serving it can be a very stressful situation to be in. On one hand you have to deal with an ever increasing number of illnesses which last longer and take more time to recover from and on the other leaving most people unable to complete tasks and reducing their overall level of performance, affecting promotion.

As an organisation we would like to see a publication of all current medical information regarding Gulf War Syndrome. This publication would contain not only the facts as they stand today but also any personal observations by the doctors concerned. The paper itself would be aimed at general practitioners and medical consultants and would give the facts as they are. More importantly it should make them understand that in a care of Gulf War Illness it is more important to keep an open mind and practice caution when treating these individuals and not resort to ignoring the problem because the government does not officially recognize Gulf War Syndrome.

We would like to see the current Medical Assessment Programme taken away from the military and placed in Regional Centres and enlarged to take into account investigation and treatment. This act would not take veterans away from their general practitioners but would allow veterans to seek specialized treatment and investigation, both satisfying the patient that help was always available when needed and also providing a better understanding to doctors of how the illnesses affect their patients. It would also provide

much needed raw data, which can give researchers the most comprehensive study into the illness.

The absorption of the War Pensions Department into the newly created Veterans Affairs Agency has left Gulf Veterans worried that where before this was a Government Department, independent of the military influence, the opposite has now occurred. There are still veterans who are waiting years for a decision to be made on their eligibility for pension. If their case has to go to the Court of Appeal there is no fast track system. On average appeal cases are taking two years to be heard. This whole system creates hardship and stress on the veteran. There is also no consistency of diagnosis. One person can have a diagnosis recognized and granted a war pension for the condition and a second veteran can have exactly the same condition but it is not acceptable to the War Pension Agency. A recent case that went before the Appeal Court found in favour of the Gulf Veteran that his diagnosis of Gulf War Syndrome did exist and the term Gulf War Syndrome was recognized in medical books and journals. There are thousands of veterans who had this diagnosis refused by the War Pension Agency on instruction from the Ministry of Defence that they did not recognize the terminology. When the veterans association brought this anomaly to the attention of the Minister Dr. J Reed, he informed us that the Ministry of Defence and the War Pensions Agency would only accept the condition: "Ill-defined signs and symptoms of illness due to Gulf War Service". Each individual symptom had to be listed, but not all are accepted. Now the Ministry of Defence has to seek legal advice on the court decision. Veterans feel that the Ministry will bury this under paper and not recognize the Gulf Syndrome for fiscal reasons.

Throughout history the British soldier has been asked to fight in every corner of the planet, yet in return he has asked for very little and often received even less than that in payment. When a politician stands in the house of representatives and states that the debt we owe to our armed forces can never be adequately repaid, we feel a great sense of pride and satisfaction that the work that we as soldiers do is unique and fundamental to the preservation of the democracy and the freedom we all take for granted. However, I and many others feel that the time has come for governments to stop the spin doctoring and remove the stigma they have put on veterans suffering from Gulf War Syndrome and admit there is a problem and encourage research to assist their veterans instead of ridiculing them. After all, 539 British veterans have died of illnesses since we returned and more are being diagnosed as terminal cases each month. They and their families need answers; we as an Association can only listen to the question "Why? All they ever did was serve their Country."

Larry Cammock - Chairman

Mr. SHAYS. You take my breath away, sir. Thank you very much.

STATEMENT OF SHAUN RUSLING

Mr. RUSLING. Thank you very much, Chairman. Before giving my testimony to this honorable Committee, I would like to thank the members for the invitation to the National Gulf Veterans and Families Association to give our evidence over the illness now known and recognized as Gulf War Syndrome.

Could I, on behalf of my members, offer our gratitude and thanks to the Rt Honorable Lord Alf Morris for his unswerving support and his continued efforts to help British Gulf War Veterans who are suffering ill health from fighting for their country in a war that is clearly recognized as the most toxic war ever fought and at this point clearly mark out for the committee our most sincere sadness that we have been abandoned by our country and that successive governments since the Gulf War have adopted a policy that is based on "Don't look, don't find and cannot see."

The Ministry of Defence set up the Gulf Veterans Illness Unit in 1996 after the former Permanent Secretaries of State, Sir Richard Mottram and Dr. Edgar Buckley came under scathing criticism by the Defence Committee under Mr. Menzies Campbell QC MP and Mr. Bruce Geoge MP. On this matter I refer to Hansard and the Defence Committee reports from that date and to the present. Evidence has been presented to the said committee in written and verbal format by the former Chairman Major Ian Hill (deceased) and myself the current Chairman of the National Gulf Veterans & Families Association.

It would be very easy to point out several Members of Parliament and blame them. However they have only repeated the Brief of government policy which is one of cover up of (GWS) at all cost and to ensure that no responsibility for any actions or none actions taken at the time of war is the responsibility of anyone. The attitude of the MOD is one of go and seek charitable help and hand outs. This crass attitude to those of our armed forces servicemen and women who in the 21st century have families to raise and mortgages to pay and are unable to do so because thy are ill, because they fought for their country, will devastate our fighting ability in the future.

If safeguards are not in place to ensure that ill and injured soldiers get the best medical care and disablement pensions etc, then politicians should not send men and women to war in the 21st century or only at the cost of invasion. And in taking that action it has been paramount to the Ministry of Defence that every issue is spun and covered up by civil servants of the GVIU working on the same brief refuting and covering every issue up of any significance.

The MoD have been aided and abetted by the DoD to the point of American dollars paid by the DoD to assist in the cover up of GWS by employing medical doctors here in the UK, which are Treasury Solicitors medical expert witnesses. These doctors of the Kings College cannot claim to be unbiased they are in our, the veterans' opinion, in a position of conflict of interests and it is not our interests that they are concerned about.

The evidence is of poor medical value and used only in one manner that is to be the use of epidemiology to lose our illness in amongst the general populous and to down grade our illness by the use of comments in medical papers like, Three times more likely, to be ill as any other troops. This type of evidence, which has been funded by the DoD and MoD is nothing other than psychobable and government ploy.

The best medical evidence and most reliable that we have seen are the nerutological findings of Dr. Robert Haley et al based on proper medicine and not on form filling and paper shuffling of figures. This evidence is supported by the diagnosis of ill Gulf War veterans the length and breadth of the UK diagnosed with Gulf War Syndrome, based on physical medical investigation based on medicine by medical doctors not spin doctors from the MoD whose interests lie elsewhere.

We here at the National Gulf Veterans & Families Association have paid for our own investigations into our ill health because our government has chosen to turn their back on us. We have looked into the issue of organophosphates with blood tests from Manchester University, which Dr. Mackness will be speaking to you about later. In addition to the OPs we have funded our own tests into vaccines given for the Gulf War at the Bremen University Germany, also at The Tulane University, New Orleans, USA.

Tests have been carried out at three independent laboratories for depleted uranium in the urine of British Gulf War veterans. The Waterloo University, Canada, the Memorial University, Canada and the NERC isotope geosciences laboratory here in England in the United Kingdom which I have presented the results to you gentlemen today, which produce the results on tests carried out in the UK. All three have

shown the presence of depleted uranium in the Gulf veterans' urine 11 years after the Gulf War. The controls used were found to be negative. This evidence shows a significant exposure at the time of the Gulf War. Professor Hooper will comment on these matters, that will be this afternoon, in a scientific manner.

Mr. SHAYS. Can I interrupt you—can you all hear at the back of the room?

We will ask you all to speak a lot louder.

Mr. RUSLING. In addition to depleted uranium being found extreme enrichment of 236U was also clearly present in the bone of Mr. Michael Burrows and in the urine of Mr. Shaun Foulds, leaving the question: Were the coalition troops the first to be exposed to "dirty bombs" in 1991?

For your final reference I refer to my own pensions appeal tribunal decision held on 19th April 2002 some 9 years after application, whereupon every possible excuse and dirty trick was used by the Veterans Agency, formerly the War Pensions Agency, from allowing my appeal to be heard by an independent tribunal. I attach a copy and I look forward to your questions.

[The statement of Mr. Rusling follows:]

NATIONAL GULF VETERANS & FAMILIES ASSOCIATION
Registered as
THE MM NATIONAL GULF VETERANS & FAMILIES BENEVOLENT ASSOCIATION
CHARITY NO 1074867
PATRON: - RT. HON EARL KITCHENER OF KHARTOUM TD DL
PRESIDENT:- PROF. MALCOLM HOOPER PhD.,B. Pharm.,MRIC,C Chem
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Servimus Fide

Congress of the United States
Subcommittee on National Security, Veterans Affairs,
And International Relations
Christopher Shays, Connecticut

18th June 2002

Dear Mr Chairman

Before giving my testimony to this honourable Committee, I would like to thank the honourable members for the invitation to the National Gulf Veterans and Families Association, to give our evidence on the way that British Gulf War Veterans have been treated by our Government, over the illness now known and recognised as **Gulf War Syndrome**.

Could I, on behalf of my members offer our gratitude and thanks to the Rt Honourable Lord Alf Morris AO QSO for his unswerving support and his continued efforts to help British Gulf War Veterans who are suffering ill health from fighting for their Country in a War that is clearly recognised as the most toxic War ever fought, and at this point clearly mark out for the committee our most sincere sadness that we have been abandoned by our Country and that successive Governments since the Gulf War have adopted a policy that is based on **don't look, don't find and cannot see**.

The Ministry of Defence set up the Gulf Veterans Illness Unit (GVIU) in 1996 after the former Permanent Secretaries of State Sir Richard Mottram and Dr Edgar Buckley came under scathing criticism by the Defence Committee Mr Menzies Campbell QC MP and Mr Bruce George MP (now Chairman).

On this matter I refer to *Hansard* and the Defence Committee reports from that date and to the present. Evidence has been presented to the said committee, in written and verbal format by the former Chairman Major Ian Hill (Deceased) and myself the current Chairman of the National Gulf Veterans & Families Association.

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If safe guards are not in place to ensure that ill and injured Soldiers get the best medical care and disablement pensions etc., then politicians should not send men and women to War in the 21st century or only at the cost of invasion.

And in taking that action it has been paramount to the Ministry of Defence that every issue is spun and covered up by Civil Servants of the GVIU working on the same brief refuting and covering every issue up of any significance.

The MoD have been aided and abetted by the DoD to the point of American Dollars paid by the DoD to assist in the cover up of GWS by employing Medical Doctors here in the UK, which are ***Treasury Solicitors Medical Expert witnesses.*** These Doctors of the Kings College cannot claim to be unbiased they are in **Our,** the veterans opinion, a **Position of Conflict of interests** and it is not our interests that they are concerned about.

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We here at the National Gulf Veterans & Families Association have paid for our own investigations into our ill health because our Government has chosen to turn their back on us.

We have looked into the issue of Organophosphates with blood tests from the Manchester University, which Dr Mackness will be speaking to you later.

In addition to the OP's we have funded our own tests into Vaccines given for the Gulf War, at the Bremen University Germany also at The Tulane University, New Orleans, U.S.A.

Tests carried out at three independent laboratories for Depleted Uranium in the urine of British Gulf War Veterans. The Waterloo University, Canada, the Memorial University, Canada and the NERC Isotope Geosciences Laboratory in the United Kingdom. All three have shown the presence of depleted uranium in the Gulf Veterans' urine 11 years after the Gulf War. The controls used were found to be negative. This evidence shows a significant exposure at the time of the Gulf War. Professor Hooper will comment on this later.

In addition to Depleted Uranium being found extreme enrichment of 236U was also clearly present in the bone of Mr Michael Burrows and in the urine of Mr Shaun Foulds, leaving the question where the coalition troops the first to be exposed to "dirty bombs" in 1991?

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Thank you for your time gentlemen.

Shaun Rusling (Mr)
Chairman

COURT SERVICE

20 MAY 2002

P.A.T. 1

PENSIONS APPEAL TRIBUNALS (ENGLAND AND WALES)

THE COURT SERVICE
PENSIONS APPEALS TRIBUNALS
48 - 49 CHANCERY LANE
LONDON WC2A 1JF
TEL: 0207 - 947 - 7034

APPELLANT'S NAME & ADDRESS

Mr S Rusling
4 Maspin Close
Kingswood
Hull
East Yorks. HU7 3EF

DATE: 19/4/02

COURT NO:

HELD AT: Leeds

TRIBUNAL CASE NO: ENT/7932/97

VA NO: WE0516648

DECISION ON APPEAL

PENSIONS APPEAL TRIBUNALS ACT 1943

The Tribunal finds that the injury, wound or disease on which the claim is based namely:

GULF WAR SYNDROME

is attributable to Service.

The Tribunal **ALLOWS** the Appeal.

Hugh Fraser
Chairman of Tribunal

Decision sent to VA
Date: 20/5/02

* Art. 4 appeals -date of discharge from Service
* Art. 5 appeals -date of claim

Mr. SHAYS. Thank you very much.

Mrs. Thompson, wonderful to have you here. I just want you to know that the questions will be friendly but we will learn a lot from them. So, you can feel very welcome here and it is truly a privilege to have you here today. You have the floor.

STATEMENT OF SAMANTHA THOMPSON

Mrs. THOMPSON. Nigel Thompson died in January 2002 after a long and courageous battle against Motor Neurons Disease (ALS). He was just 44 years old and leaves a widow, Samantha and a seven year old daughter, Hannah who is here today.

Nigel was a Petty Officer in the Royal Navy Fleet Air Arm and served in the Gulf War in 1991. Shortly after returning from the Gulf he started displaying the symptoms of Motor Neurone disease. Nigel always believed his terminal condition to be attributable to his active service in the Gulf. Right up to his death he fought tirelessly on behalf of all Gulf War veterans as part of the campaign for recognition of Gulf War illness. Nigel also repeatedly called for an independent public inquiry into what went wrong during Operation Desert Storm that left so many military personnel ill or dying.

Nigel joined the Royal Navy in September 1973 aged 16. As a member of the Fleet Air Arm he spent most of his service career with commando helicopter squadrons. His service at sea included tours on numerous ships including HMS Hermes, the Fearless, Cherry B and HMS Glamorgan. He also saw active service in Northern Ireland, the Gulf and Bosnia.

Tragically in 1993 he was diagnosed with the terminal condition Motor Neurone Disease and left the Navy in 1994 after 20 years service reaching the position of Petty Officer. He would have undoubtedly been promoted to Chief Petty Officer if it were not for his ill health, as he was on the promotion signal for that year.

Nigel always maintained strong links with the Royal Navy never blaming them for what happened to him. He worked tirelessly on behalf of other Gulf War veterans and was a huge supporter of the Royal British legion in every way. Despite his condition and failing health, Nigel helped to raise £250,000 for the Legion and received the Wilkinson Sword of Peace from Prime Minister Blair in 1998 for his efforts.

There were approximately 50,000 British service personnel who served in the Gulf conflict. As a military operation it appeared a stunning success; unfortunately though on returning home a substantial number of veterans became ill. Very early on it became clear to Nigel and many others that a number of potentially fatal mistakes had been made in the pre-treatment of our troops against a possible chemical or biological attack by the Iraqis. Nigel could always remember just how real the threat of an Iraqi chemical attack actually was. This being the case every means of protecting our troops had to be taken. However, before authorizing the use of NAPS tablets, an unlicensed drug and then totally ignoring the warnings of organophosphates and anthrax the MoD were guilty of the worst kind of negligence.

Taken together these three undisputed facts alone show scant disregard for the long term health of our troops, add to that the question of why no such problem surfaced after other recent conflicts, then you have to question the policy of mass inoculations. Put all of this together and you can see why veterans have concerns.

The MoD will say that they acted in the best interests of our troops but it appears that not enough research was undertaken prior to the administration of the drugs given to protect them against the very real threat they faced in the desert. Nigel always maintained that had his condition been triggered by something that happened in the Gulf he would far rather it had been the enemy responsible than his own side. But sadly that does not seem to be the case.

Nigel very much doubted that his name would ever appear on a plaque dedicated to the people killed in the Gulf War but he was adamant that the Gulf War was going to be responsible for his death just as certain as if he had been killed in action.

The people working in Whitehall at the MoD today are exactly the same people who worked there when faxes about anthrax went missing and written warnings about the overuse of OPs were being ignored. The only way the whole truth will ever come out is if the Prime Minister orders a full and independent public inquiry.

Nigel would often speak of the photo inside the front cover of the Royal Navy Divisional Officer's handbook. It is of a young sailor and wren. At the bottom of the page it says "the most important factor." He always said it was a pity that the people making the decisions at the Ministry of Defence hadn't bothered to look at the photo. It seemed to Nigel that the day you handed in your ID card the MoD washed their hands of you and it was the Royal British Legion who were thankfully there

to pick up the pieces. He would say however that from now on the MoD must realize that the men and women who put their lives on the line for this country will be knocking on their doors if problems ensue.

The Gulf War has to be the last time something like this happens. British troops deserve better, they are not just numbers but people, intelligent people and should start being treated that way.

Life has been incredibly difficult since Nigel died almost five months ago. Our lives have literally been turned upside down. Everything revolved around Nigel and his care; my days were spent caring for him practically 24 hours a day. Thankfully a wonderful team of carers assisted me in this privileged task towards the end, as his needs increased. Now there is no care to be done for Nigel, no carers in our home or wheel chairs. It is a very quiet house now.

Our daughter misses her father immensely and this Sunday will be very hard for her, as it will be our first Father's Day without Nigel. We plan to visit West Malvern where he is buried so Hannah can lay some flowers on her father's grave. A most heart-breaking event for a seven year old.

As she gets older, Hannah will undoubtedly start to ask questions about her father's illness and untimely death. I only hope I can give her the answers to these questions. I hope I am still not asking them myself.

[The statement of Mrs. Thompson follows:]

Evidence being given by Mrs. Samantha Thompson at the Congressional hearing on June 18th

Nigel Thompson died in January 2002 after a long and courageous battle against Motor Neurone Disease (ALS). He was just 44 years old and leaves a widow, Samantha and a seven year old daughter, Hannah.

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Samantha Thompson.

Mr. SHAYS. Your husband is a hero, ma'am. Your Dad, young lady, is a hero to this country and to the world of freedom.

Flight Lieutenant Nichol?

STATEMENT OF JOHN NICHOL

Flight LIEUTENANT NICHOL. I am John Nichol and during 15 years of service in the Royal Air Force I served in the Falklands and saw action in Bosnia and of course during Operation Desert Storm, the Gulf War in 1991, when I was a navigator flying Tornadoes. On the first day of that war my aircraft was shot down and I was captured by the Iraqis and I spent seven weeks as a prisoner of war. So, my experiences of Desert Storm include all of those experienced by service personnel during that conflict and additionally the trauma of a brutal interrogation and torture by my Iraqi captors.

Although my war was brutal, I returned to my family and friends with my senses and my health intact. Some of my friends did not return and many of my colleagues are still suffering the effect of that war 11 years on.

I retired from the Royal Air Force in 1996 and now have a career in the media and as an author, having published seven books. I have maintained my contact with the Services through a number of different charities and I am currently the President of the Gulf War Branch of the Royal British Legion. I am also a member of the Inter Parliamentary Group formed in 1994 to help present a credible case to have Gulf War veterans' concerns resolved. Many Gulf War veterans have grievances regarding the way they were treated following their return from the conflict, particularly those who subsequently left the Armed Forces.

Almost as soon as the war ended, many veterans started to complain of ill health for which they could find no attributable cause. At first, this started as a trickle but then became a steady stream and currently of the 50,000 British personnel deployed to the Gulf, in the region of 10 percent, 5,000 previously fit men and women are reporting ill health with a variety of symptoms. Most importantly, they belief their varying problems are directly linked to their service in the Gulf. Worse, they have suffered considerable angst due to the way in which they have been treated and because of the lack of recognition regarding their situation.

The epidemiological studies conducted into the health of Gulf War veterans have confirmed that those who served in the Gulf display more ill health than one similar group that did not deploy to the Gulf and another group drawn from those who served in Bosnia. It is my believe and that of the Gulf War Group, that the circumstances in this conflict were markedly different to recent conflicts elsewhere and that it is some of the very actions taken to protect those of us who served there that could have produced the conditions so prevalent amongst veterans who complain of ill health.

My suspicion and the suspicion of many others, is that some or all of the things that were different regarding deployment and service in the Gulf are responsible for the situation. What was so different?

First, we had the multiple immunization program (some veterans were given injections for up to 14 different conditions in the space of 2 weeks.) Secondly, we had the issue of pyridostigmine bromide (NAPS tablets) as protection against chemical and biological agents. There was the exposure to smoke when withdrawing Iraqi troops fired the Kuwaiti oil wells. There was also the possible exposure to organophosphates used as pesticides during deployment. There was also the possible exposure to chemical weapons, particularly those who were under the Khamisiyah plume when it was destroyed. Then the exposure to depleted uranium from munitions expended mainly by Allied Forces.

The possible inter-reaction of these many factors is incalculable. But, if we look only at the immunization program, if 50,000 individuals were inoculated against measles it would not be unusual for a small percentage to show symptoms of an adverse reaction. Therefore, if the same number are immunized against 14 different diseases in the space of two weeks, there is no telling how their bodies might react. All of the other items I mentioned could have made a number of veterans unwell in their own right.

Most of these factors were not present in recent conflicts. Indeed I can remember experiencing none of them during my deployment to the Falkland Islands in 1982 or during my service over Bosnia in 1993. And subsequently, the level of ill health amongst veterans from these conflicts seems to be much lower than amongst their colleagues from the Gulf War.

In the main, all the action taken by our Ministry of Defence, the immunization program, the use of pesticides etc., to protect those of us who served in the Gulf was done in the best interests of the Gulf veterans. However, when the troops re-

turned and started to complain of medical problems, the MoD's reaction was far from satisfying. The initial response was to state that they were open-minded about the existence of a problem. But that supposed open-mindedness was usually tinged with cynicism and very little was done to assist those who were becoming more unwell.

Some examples include the inadequate debriefing of those returning from the conflict, particularly reservists called from civilian life into action. There was the apparent loss or destruction of individuals' medical records. There was the initial denial by the MoD that organophosphates had been used as pesticides; sluggishness in establishing a medical assessment program. It took four years to place this on a full time basis and even now there is great suspicion from veterans with regard to its effectiveness.

There is also a lack of monitoring and specific treatment from Gulf War veterans. It is only recently that our country's general practitioners, which all veterans have to turn to once they have left the service, have been advised of the possible conditions veterans may present with. And with the demise of the Service hospitals there is virtually nowhere where the ex-Service community can be referred for priority treatment. We believe that this is also a problem being experienced by those currently serving in the Armed Forces where drastic cuts in the Service medical provisions are leaving our Service personnel exposed to problems not experienced in the past.

The veterans themselves departed for the Gulf in an "A1" condition of health. They now expect, indeed they have a right, to have their problems recognized and addressed and where mistakes have been made, this should be acknowledged. In comparison with our American colleagues, the British veterans believe that little has been done to address their problems. For instance, ongoing medical support, particularly for those who have left the Armed Forces is sadly lacking. Many veterans have had real difficulty obtaining their full medical records. Some have suffered wilful obstruction.

British veterans are dependent on our National Health Service recognizing and addressing their problems, whereas our American colleagues have the benefit of veterans' medical support. Difficulties have arisen for some veterans in achieving full recognition of their condition being attributable to their Gulf service and this has delayed or reduced their level of war pension.

The results of the errors that have been made and the inadequate provisions to support veterans have left considerable disquiet amongst those who served in this theater of war. In addition, the needs of many that have fallen on hard times have yet to be answered, even as far as the issue of a sensible level of war pension. In an offensive snub to those who have risked their lives, many veterans are forced into an undignified fight for a pension which should be offered to them with pride.

Veterans feel neglected and believe that the only answer is for the Prime Minister to approve the establishment of a public inquiry in which all of these issues might be openly reviewed and the lessons learned actioned quickly. If there is nothing to hide, why shy away from an open inquiry to establish why our veterans are dying?

To finish, I heard this anecdote from an American campaigner:

"If 100 people went to a banquet and during the night one got sick—you would never know the cause. But if that same 100 people went to a banquet and 10 of them became sick afterwards—you might never know what caused the sickness—but you can be damned sure that the banquet was to blame." I am one of the lucky ones, I didn't get sick, butyearsyy of my colleagues did and some, as you have heard today have died in tragic circumstances. Two British governments how now said that there is no evidence that Gulf War Syndrome or sickness or whatever we decide to call, it exists. Yet how can we prove it, how can we recreate what happened 11 years ago? Are we to take a group of volunteers, expose them to a cocktail of drugs, force them to breathe the smoke from oil fires, feed them NAPS tablets, spray them with pesticides, then expose them to depleted uranium and chemical weapons? We can never recreate those conditions.

I suspect we may never know what happened to our people 11 years ago during Desert Storm, but I do know this: The men and women of our Armed Forces have always been willing to make the ultimate sacrifice and give their lives in the service of their country. With the Gulf War long over, many are still making that ultimate sacrifice. And in the aftermath of the conflict some of our political leaders are too quick to detach themselves from us. I would expect so much more than that.

Congressman Putnam, you said earlier on the tickertape has been swept up, the victory parades are over, but 11 years on, the veterans are sick, still dying and they deserve better.

[The statement of Flight Lieutenant Nichol follows:]

Statement by Flt Lt John Nichol
To the US Congressional Subcommittee on National Security, Veterans Affairs and International Relations
Tuesday 18th June 2002

I am John Nichol and during 15 years of service in the Royal Air Force I served in the Falklands and saw action in Bosnia and of course during Operation Desert Storm, the Gulf war in 1991, when I was a navigator flying Tornadoes. On the first day of that war, my aircraft was shot down and I was captured by the Iraqis and I spent seven weeks as a Prisoner Of War. So, my experiences of Desert Storm include all of those experienced by Service personnel during that conflict and additionally the trauma of interrogation and torture by my Iraqi captors.

Although my war was brutal, I returned to my family and friends with my senses and my health intact. Some of my friends did not return and, many of my colleagues are still suffering the effects of that war 11 years on.

I retired from the Royal Air Force in 1996 and now have a career in the media and as an author, having published seven books. I have maintained my contact with the Services through a number of different charities and I am currently the President of the Gulf War Branch of the Royal British Legion. I am also a member of the Inter Parliamentary Group formed in 1994 to help present a credible case to have Gulf War veterans' concerns resolved.

Many Gulf War veterans have grievances regarding the way they were treated following their return from the conflict. Particularly those who subsequently left the Armed Forces.

Almost as soon as the war ended, many veterans started to complain of ill health for which they could find no attributable cause. At first, this started as a trickle but then became a steady stream and currently of the 50,000 British personnel deployed to the Gulf, in the region of 10% - 5,000 previously fit men and women - are reporting ill health with a variety of symptoms. Most importantly, they believe their varying problems are directly linked to their service in the Gulf. Worse, they have suffered considerable angst due to the way in which they have been treated and because of the lack of recognition regarding their situation.

It is worth noting that the epidemiological studies conducted into the health of Gulf War veterans have confirmed that those who served in the Gulf display more ill health than one similar group that did not deploy to the Gulf and another group drawn from those who served in Bosnia. It is my belief, and that of the Gulf War Group, that the circumstances in this conflict were markedly different to recent conflicts elsewhere and that it is some of the very actions taken to protect those of us who served there, that could have produced the conditions so prevalent amongst veterans who complain of ill health. The range of illnesses spreads from the extreme, such as cases of Motor Neurone Disease and Cancer, across the medical spectrum.

My suspicion, and the suspicion of many others, is that some, or all, of the things that were different regarding deployment and service in the Gulf are responsible for the situation. What was so different?:

1. The multiple immunisation programme (some veterans were given injections for up to 14 different conditions in the space of 2 weeks).

2. The issue of pyridostigmine bromide (NAPS tablets) as protection against chemical and biological agents.

3. The exposure to smoke when withdrawing Iraqi troops fired the Kuwaiti oil wells.

4. The exposure to organophosphates used as pesticides during deployment.

5. The possible exposure to chemical weapons (particularly those who were under the Khamisiyah plume).

6. The exposure to depleted uranium from munitions expended mainly by Allied Forces.

The possible inter-reaction of these many factors is in-calculable. But if we look only at the immunisation programme, if 50,000 individuals were inoculated against measles it would not be unusual for a small percentage to show symptoms of an adverse reaction. Therefore, if the same number are immunised against 14 different diseases in the space of two weeks, there is no telling how their bodies might react. All of the other items I mentioned could have made a number of veterans unwell in their own right.

Most of these factors were not present in recent conflicts. Indeed I can remember experiencing NONE of them during my deployment to

the Falkland Islands in 1982 or during my service over Bosnia in 1993. And subsequently, the level of ill health amongst veterans from these conflicts seems to be much lower than amongst their colleagues from the Gulf War.

Support and medical management of those who served in the Gulf

In the main, all of the action taken by our Ministry Of Defence, the immunisation programme, the use of pesticides etc., to protect those of us who served in the Gulf was done in our best interests.

However, when the troops returned and started to complain of medical problems, the MOD's reaction was far from satisfying.

The initial response was to state that they were open-minded about the existence of a problem. But that open-mindedness was usually tinged with cynicism and very little was done to assist those who were becoming more unwell. Examples included:

1. Inadequate debriefing of those returning from the conflict, particularly reservists.

2. Loss or destruction of medical records of individuals.

3. The initial denial by the MOD that organophosphates had been used as pesticides.

4. Sluggishness in establishing a medical assessment programme. It took 4 years to place this on a full time basis and even now there is great suspicion from veterans with regard to its effectiveness.

5. The lack of monitoring and specific treatment from Gulf War veterans. It is only recently that the country's General Practitioners (which all veterans who have left the Services rely on) have been advised of the possible conditions veterans may present with. And with the demise of the Service hospitals there is virtually nowhere where the ex-Service community can be referred for priority treatment. We believe that this is also a problem being experienced by those currently serving in the Armed Forces where drastic cuts in the Service medical provisions are leaving our Service personnel exposed to problems not experienced in the past.

Veterans expectations

The veterans themselves departed the Gulf in an 'A1' condition of health. They now expect their problems to be recognised and addressed. And where mistakes have been made, for this to be acknowledged. In comparison with their American colleagues, the British veterans believe that little has been done to address their problems. For instance:

1. Ongoing medical support, particularly for those who have left the Armed Forces, has been lacking

2. Many veterans have had real difficulty obtaining their full medical records. Some have suffered wilful obstruction.

3. British veterans are dependent on our National Health Service recognising and addressing their problems, whereas our American colleagues have the benefit of veterans' medical support.

4. Difficulties have arisen for some veterans in achieving full recognition of their condition being attributable to their Gulf service and this has delayed or reduced their level of war pension.

The results of the errors that have been made and the inadequate provisions to support veterans have left considerable disquiet amongst those who served in this theatre of war.

In addition, the needs of many that have fallen on hard times have yet to be answered, even as far as the issue of a sensible level of war pension. In an offensive snub to those who have risked their lives, many veterans are forced into an undignified fight for a pension which should be offered to them, with pride.

Veterans feel neglected and believe that the only answer is for the Prime Minister to approve the establishment of a Public Inquiry in which all of these issues might be openly reviewed and the lessons learned actioned quickly. If there is nothing to hide, why shy away from an open inquiry to establish why our veterans are dying?

To finish, I heard this anecdote from an American campaigner:

"If 100 people went to a banquet and during the night one got sick – you would never know the cause. But if that same 100 people went to a banquet and 10 of them became sick afterwards – you might never know what caused the sickness – but you can be damned sure that the banquet was to blame"

I am one of the lucky ones, I didn't get sick. But many of my colleagues did and some, as you have heard today, have died in tragic circumstances.

Two Governments have now said that there is no EVIDENCE that Gulf War Syndrome, or Sickness, or whatever we decide to call it exists. Yet how can we prove it, how can we recreate what happened 11 years ago? – Are we to take a group of volunteers, expose them to a cocktail of drugs, force them to breath the smoke from oil fires, feed them NAPS tablets, spray them with pesticides then expose them to depleted uranium and chemical weapons? We can never recreate those conditions.

I suspect we may never know what happened to our people 11 years ago during Desert Storm – but I do know this, the men and women of our Armed Forces have always been willing to make the ultimate sacrifice and give their lives in the service of their country. With the Gulf War long over, many are still making that ultimate sacrifice. And in peace, they truly deserve far better treatment from the politicians who are so ready to send them to war.

Someone, somewhere, is not being fair to our veterans.

Mr. SHAYS. A very powerful statement, Lieutenant, powerful particularly given you are a hero of the Gulf War and you are not speaking for yourself, you are speaking for all those men and women you served with.

Mrs. Thompson, I was thinking after you had completed, wouldn't it have been nice if we had got here before January 2002 to hear directly from your husband; but how proud your husband would be to have heard you today.

Mr. Rusling and Mr. Nichol, you have been speaking out for so long on this topic and it is a privilege to have you here. Feel free to take ten minutes, we have time and we came here to make sure we got the information we needed so we are not leaving until we get the questions.

Mr. SANDERS. Thank you, Mr. Chairman. Thank you all four for your testimony. I want to say the struggle you are waging here is terribly important for tens of thousands of American soldiers suffering the same problems. It is important we work together and I thank you all very much for what you have just said.

Let me start off, I am not an expert on the British military but I assume the men and women you sent off were strong and well-trained?

Mr. SHAYS. There was no answer but everybody's head went up and down.

Mr. SANDERS. Mr. Cammock, in your statement you mentioned that you held a meeting and that 500 veterans came to that meeting complaining of a variety of illnesses and since that time 98 people who served in the Gulf have taken their own lives?

Mr. CAMMOCK. That is correct.

Mr. SANDERS. I would assume if you started off with a healthy group of people trained in the military that these numbers are astonishing. Can you give me some explanation how so many people have complained of illnesses and why so many people have taken their own lives from what was initially a very healthy group of people?

Mr. CAMMOCK. Initially, the first meeting that formed the Association was due to a reunion—

Mr. SHAYS. Can I ask you to speak a little louder?

Mr. CAMMOCK. Sorry. Initially the first meeting of veterans from the Gulf was held every 12 months, it was an annual reunion for the veterans who went to the Gulf and we lost quite a few of the men due to a friendly fire incident. The regiment concerned was a local regiment in North East England. They held their reunion and the members of that regiment were surprised that some of their associates coming into the reunion obviously showing signs of illness, some of them on crutches, some with walking sticks and one or two were confined to wheelchairs. That was in the 12 month period coming back from the Gulf.

From that, two of the people who were at that reunion contacted local MPs and they queried what was wrong with these people to begin with. From that, the two MPs put a notice into the local evening papers asking for other veterans who had served during the Gulf War who were showing signs of illness or who were worried about any aspects of the Gulf War to attend a meeting that was arranged at a local venue. They expected roughly about 50-100 people to turn up. 500 turned up, not only from the local area but from around the country. Those people that attended from around the country also came with information that there were other people in their own local areas suffering the same condition.

Mr. SANDERS. Let me interrupt you. My State is in the northern part of our country where people from the military are not very happy to come forward. "I was not shot, I was not wounded but I'm feeling pretty sick."

Mr. CAMMOCK. That is exactly the same. It is only today I spoke to a senior officer who is still serving and he has got a condition that other veterans have had. He has spoken to his medical officer and his medical officer says it is his age.

Mr. SANDERS. You suspect there are still people in the military not coming forward?

Mr. CAMMOCK. Yes, they are feeling shoved away by their medical officer saying there is not a problem, the MoD is telling them there is not a problem and there are other things to look at. It could be stress, it could be age, it could be all kinds of thing.

Mr. SANDERS. Thank you. Let me go to Mrs. Thompson and thank you very much for your testimony. I don't know how to phrase this—let me phrase it this way: Mrs. Thompson, if you were in the US now and were an American citizen, your husband's condition would have been acknowledged as having been caused by participation in the Gulf War. You are a British citizen and that is not the case. How do you respond to the fact that in the US finally, I should say after many, many years, we have finally acknowledged the condition that your husband passed away from but that is not the case right now in the UK?

Mrs. THOMPSON. It is very sad for the people suffering not to have the condition recognized as attributable to Gulf War service because I believe there are several servicemen who died from Motor Neurons Disease and that it is way above the amount that should have come back. I think obviously the news is welcome from America that progress has been made and I can only hope the Mod and other people will follow the progress made.

Mr. SANDERS. Since the acknowledgement in the US that ALS is attributable to service in the Gulf, has there been a response from the British government to you and other families?

Mrs. THOMPSON. Not that I am aware of to me and other families which is quite sad. You feel forgotten most of the time.

Mr. SANDERS. You are not forgotten. Let me ask Lieutenant Nichol and Mr. Rusling, both of you were appropriately in office and let me tell you we have heard almost exactly the same testimony in the US time and time again of American veterans who were frustrated, angry and disappointed by the lack of response of their own government to their particular problems. Given the fact that so many people have been hurting and in some cases dying in the UK, why is the government so reluctant to say "Yes, we understand you have a problem; yes, we will spend the money to find the cause of the problem; yes, we will compensate veterans. How can we be of help to you?" Why do you think the government has not responded in that way?

Flight LIEUTENANT NICHOL. I have no idea and I think perhaps a public inquiry might help to establish that, if there is nothing to hide, nothing to worry about, nothing to cover up. We are told so many times we are paranoid, then have a public inquiry, have an independent inquiry so people like Sam don't have to go through what they suffered. Larry should not have to suffer as he is suffering. Veterans should not have to come begging for help 11 years after the end of the conflict. It really is a tragedy that we treat our veterans in this way.

Mr. RUSLING. I think though that that will set a precedent to look at other war veterans and do likewise with them, look at them in another manner.

Mr. SANDERS. You think there is a financial aspect?

Mr. RUSLING. Yes. I believe the matter would have been dealt with a long time ago.

Mr. SANDERS. Thank you all very, very much, Mr. Chairman.

Mr. SHAYS. I would say in some cases it is a physical element but also we rejoice that there were so many that came back safe and so few who were killed or wounded and I think that it is difficult for us to come to grips with the fact that more came home wounded than we wanted to acknowledge.

Mr. RUSLING. I think also it is the position of accountability and certain decisions had to be made at the time. Some were errors that were made and perhaps they have to be accountable for their actions. That is very sad for us because we are carrying that back now.

Mr. SHAYS. A nice point. It is not dissimilar as Mr. Sanders said. Your testimony could almost be made in the US. There is not much difference. Mr. Putnam, you have a point?

Mr. PUTNAM. Thank you very much. This testimony is virtually identical to the US. Two weeks ago I had a similar forum in my constituency where I had over 200 of my constituents meeting this group of National Guards come back with very built-in illnesses. Young men in the prime of their life who came back with the illnesses of 80 year olds. Live conditions, neurological diseases. In their case we cannot identify what it was. They had to use a certain paint to prepare the equipment and they were ordered to abandon all procedures, to abandon all safety equipment to expeditiously complete their task. Chairman, Ross, you are the heads of your respective organizations. In similar organizations there are other coalition partners and do they report similar stories?

Mr. RUSLING. Yes there is a similar organization in Canada and Australia. The numbers are far smaller but they have exactly the same problems as we have.

Mr. CAMMOCK. The Norwegians and French, they have the same sort of problems.

Mr. PUTNAM. What about the Kuwaitis, do we know anything about that?

Mr. CAMMOCK. They used to acknowledge it initially but it sort of tailed off but the last report we had was that there was a large amount of illness in the Kuwaiti population, certainly with lung cancer.

Flight LIEUTENANT NICHOL. I think Lord Morris has got the most information on how the Kuwaitis are suffering as well. As I understand it they are suffering in high numbers in very similar if not identical conditions to what our veterans are suffering.

Mr. PUTNAM. Those of you who were given a range of vaccines and injections, were they administered evenly throughout the services or did different Commanding Officers take different processes to dispensing those treatments and vaccines?

Flight LIEUTENANT NICHOL. Larry and Shaun can talk about the large numbers but from my perspective as an RAF officer we were given the option of taking the vaccine and I remember specifically turning down having anthrax injected into my body. It was a procedure, it was your own decision if you wanted it and at my level a large number of people chose not to take these inoculations.

Mr. RUSLING. We received no choice in the matter. We were given a time to parade for our vaccinations and we did so and at the time we were vaccinated, a couple of days later some more vaccine. Two days later, some more vaccine and we were not given a choice at all.

Mr. CAMMOCK. Lt. Nichol is quite right there about the RAF giving the option about the inoculation, the reason being that they realized that a flight crew, you could not afford to have a flight crew ill through inoculations and, therefore, it is entirely up to the individual if he accepted; but on the service side, it was compulsory. On the first day there were twelve inoculations all at the same time. A few days later then you went to a different barracks for other inoculations and as far as the Gulf was concerned, if you were in a transport combi half-way up the MSR, there is a refuelling base run by the Americans. If you were unlucky enough to get there before 4:00 o'clock and if you got no pump and out by 6 you got what the Americans got so you could have had one in the morning and another at the base in the afternoon.

Mr. PUTNAM. Of those twelve you had no choice?

Mr. CAMMOCK. None whatsoever.

Mr. PUTNAM. And there was no informed reason?

Mr. CAMMOCK. No.

Mr. PUTNAM. But, with the RAF it was different?

Mr. CAMMOCK. I have seen American air people who were ill and they decided they could not afford to have our air crew the same.

Mr. PUTNAM. Did the Service keep records of who accepted certain vaccines and who rejected them?

[Laughter.]

Mr. RUSLING. In 1996, Mr. Putnam, I wrote to the MoD asking for a copy of my medical documents and I received a letter back from Brigadier McDermott advising that the inoculations I had been given in the Gulf were classified secret and that has remained the same, nothing has been recorded.

Mr. SHAYS. That could conspire in the US, to give you that as an explanation: Top secret.

Mr. PUTNAM. That is not a term we use in the South, Mr. Chairman.

[Laughter.]

Mr. PUTNAM. Were you outfitted for chemical launch?

Mr. CAMMOCK. Yes.

Mr. PUTNAM. Did they ever go off?

Mr. CAMMOCK. Constantly.

Mr. RUSLING. All the time.

Mr. PUTNAM. And were they all positive?

Mr. CAMMOCK. Yes.

Mr. RUSLING. Allegedly. We don't believe so.

Mr. PUTNAM. It was the MoD—

Mr. CAMMOCK. One of my colleagues, in 1996 he died of chemically induced leukaemia and he was one of the guys who had to unmask and do the screen test and I can't really believe there was nothing at all. Can I make a point. On first March, 1991, all of our MPC equipment was removed. Our chemical suit was taken off us, given to the Iraqi prisoners of war. On 1st March we had no chemical ability of protecting us at all and from 4th-10th March one of the alarms went four times. So we were walking about in shorts and flip flops when munitions were being blown up. You could not put them on because they were no longer there. It is absolute madness. Some troops went into a minefield at the end of the battle, the battle had been won, it is just madness, absolute madness.

Mr. PUTNAM. Lieutenant, has the BCE equipment, the alarms, the sensors of any of those names changed in 11 years since the war?

Flight LIEUTENANT NICHOL. I am not an expert in chemical weapons but I can tell you on the first day of the war when the sirens went off and we were based at Bahrain, some considerable distance from the conflict itself, the chemical sirens went off as well and the answer was, "Well the batteries are flat." So, the warning for the flat battery is the same as for a warning of a chemical attack. I don't know

if one can say procedures have changed in the on-going 11 years but I am certainly not aware that they have.

Mr. RUSLING. Our systems are still the same alarm systems and we have contacted a company near Nottingham who advised they were not allowed to speak to us because it was a matter of secrecy.

Mr. PUTNAM. Let me ask you one final question. When you mentioned the presence of testing for depleted uranium and the presence of 236, could you elaborate on that?

Mr. RUSLING. Well, I don't know if you have these on the table. Do you have the test results which have come back into the UK from the last hearing in the US?

Mr. SHAYS. We have it.

Mr. RUSLING. What actually happened is we sent samples off to Canada to identify CPUs and we sent them to a gentleman called Harry Sharma. He carried out tests and he recommended that we should have tested from gastechtomotery and he recommended that that be done also in Canada. So we sent the phials off to him. Dr. Sharma reported back depleted uranium. The MoD here in the UK said, "Okay, fine, you have done these tests. However you have no control room and you have not had them done in the UK" so we now have a laboratory accepted by the MoD and we have them tested in the UK and here are the tests and the results.

All I can say as a soldier I have been exposed to depleted uranium and I would be pleased to speak to Dr. Haley with regard to neurotoxic properties because I was cutting the equipment on the casualties with shears in recent succession and I was breathing all that stuff in off the casualties. So most certainly I would like to know.

Mr. SANDERS. Let me see if I understand. Mr. Rusling, you and a number of other veterans sent your urine off to a laboratory in Canada?

Mr. RUSLING. Yes.

Mr. SANDERS. As of a month ago, it reported that you had depleted uranium?

Mr. RUSLING. No, we sent the samples in 1998 to Canada and we progressed between the two laboratories, Waterloo University and Memorial University, testing out samples which were positive.

Mr. SANDERS. In 1998?

Mr. RUSLING. Yes. What we needed to do then was get a laboratory in the UK. There is an oversight committee in the UK set up. The MoD have only just got around to getting this going. We are not prepared to wait for the MoD to bring itself kicking and screaming.

Mr. SANDERS. Tell us again. You told the MoD you have an accredited laboratory saying you have depleted uranium in your urine, seven years?

Mr. RUSLING. 11.

Mr. SANDERS. Well now, what did they say?

Mr. RUSLING. We have had Dr. Jacob to speak from the States, Dr. Harry Sharma. Dr. Sharma spoke in 1999 at the Defence Committee and pointed out to the Defence Committee that the MoD could not refuse the findings in the Canadian laboratories because they had not done any tests whatever.

Mr. SANDERS. So they confused—

Mr. RUSLING. They confuse everybody about the vaccines, spinning.

Mr. SANDERS. And they will not do the same tests?

Mr. RUSLING. No testing, none at all, nothing.

Mr. SHAYS. Thank you. At this time we will go to Lord Morris and then Ross Perot and then we will come to myself and we may come back a second round just briefly and then we go to the next panel.

Lord MORRIS. I am very moved by your presentation, Samantha Thompson, with Hannah here this morning and I am also most grateful to Larry, Shaun and John for the compelling case you have made for the Association you represent. I am sure they are very proud of the evidence you have given.

Samantha, on 25th February in answer to a parliamentary question of mine about Nigel's death, the Defence Minister told the House of Lords and I quote:

"Mr. Thompson was a man of immense courage, humanity and great cheerfulness in the face of considerable adversity. Our thoughts are with his widow, family and friends."

What initial reaction did you receive to the opinions you voiced on what might have caused Nigel's illness? Were you surprised by the reaction? Did you receive adequate help from the NHS during Nigel's long illness and when did you become aware that Motor Neurons Disease among American Gulf veterans is now accepted as war-related by the US government? Again, were you told that the prevalence of Motor Neurons Disease among Gulf veterans in the US was twice as high as the general population? In other words, the reason, the very strong reason why the US took that decision?

Mrs. THOMPSON. We felt also concerned about Nigel's ill health from 1995. We did not know whether or not we ought to go public with out fears. We took a long time because we knew the ramifications of that. One of the reasons we thought it important to voice our concerns was that every time a doctor and specialist dealt with Motor Neurons Disease, the same word kept creeping up all the time, a symptom and we kept asking why, why and we were told that Nigel being 36 and diagnosed with Motor Neurons Disease was very young and the doctors were perplexed. Obviously there are cases where young people have the illness but it is very, very rare and because it was so soon after returning from the Gulf you could not refer to that.

Nigel died on 23rd January and I believe it was the day after that it was announced about the prevalence of ALS and the Gulf and I only hope now that the same research can be done here.

Lord MORRIS. Turning to John, Bernie asked about my question about the government's reason for delay in recognition of Motor Neurons Disease as Gulf War related. The answer to my question in February said:

"The government is aware of the recent US government announcement regarding the prevalence of Motor Neurons Disease in US veterans of the Gulf conflict which follows preliminary evidence from the comparative study. The research findings are yet to be published within scientific literature. When they are produced we will consider carefully their implications for facultative veterans."

That was on 20th February. I have heard nothing further. I think also that probably answers your question, Bernie about government standards. Have you any comment on that?

Flight LIEUTENANT NICHOL. I think it is part of the prevarication for whatever reason about the suffering that Gulf War veterans have been going through for 11 years. I wrote to the Prime Minister in January 2000 on behalf of the veterans and by the British Legion to ask him to set up a public inquiry. He replied:

"The public accepts some veterans have become ill and sadly some have died. Many believe this ill health is unusual and directly related to participation in the Gulf conflict."

He, however, as the Minister explained in his letter, said:

"There is still no medical or scientific consensus on this subject and important research is in progress."

That is two years ago. That continuing important research was going on in January when Nigel died. It will go on this year and next year when more veterans die. There needs to be more acceptance and less heel-dragging.

Lord MORRIS. Shaun, your case became a test case and you referred to your case before the Appeals Tribunal. It decided in your favor; as you say it took you nine years to get there but what indication have you had from the government's reaction to the decision of the pension Appeals Tribunal?

Mr. RUSLING. Nothing whatsoever. Nobody has written to me other than the Appeals Tribunal themselves to advise me Gulf War Syndrome was accepted. Could I concur with Sam: I myself had excellent care from the NHS. The doctors who have been diagnosing Gulf War Syndrome, there has been about 28 of us in my small area in East Yorkshire in England. They have diagnosed Gulf War Syndrome. They don't argue the fact, Yes, it is Gulf War Syndrome and whether they explain the diagnosis, it is the same. It is all the Gulf War veterans are suffering illness from the Gulf War and it is madness that we have had to break it down to each compartment, chronic fatigue, bowel syndrome. It is quite ridiculous and some veterans have committed suicide because it is too much.

Lord MORRIS. Larry, I think the inquiry would like to hear more about the suffering you have had and also your opinion on why it is so important 11 years on that we should have a public inquiry. What the government said, as you know, is that there is nothing to be served by a public inquiry just as they have said for a long time. There will be nothing to be served by appointing a minister for veterans' affairs. They have said more recently and I will be quoting their words tomorrow, that they do not rule out a public inquiry now. Is there anything you want to say?

Mr. CAMMOCK. I think the need for the public inquiry is extremely urgent. Going back to Motor Neurons Disease, the national statistics are 85,000; people over the age of 55 you can expect three people suffering from Motor Neurons Disease. From the 53,600 inoculated to go to the Gulf, the Gulf veterans in this country, 8 of them have Motor Neurons Disease and all under the age of 55. Four of those men have now died.

Lord MORRIS. Even the US findings understate the seriousness of the problem. They found that Motor Neurons Disease, ALS as the Americans call it, is twice as prevalent among American Gulf War veterans as in—

Mr. SHAYS. Allow me to say, what our government was saying was that it was consistent with ALS in the general public but they were using older population but when you compared it to the younger population it was double, more than double.

Lord MORRIS. Gulf veterans emphasized by John and others, they were "A1" when they were deployed?

Mr. CAMMOCK. That's correct.

Lord MORRIS. They were for the most part between 20 and 35. There were some outside that of course but it is with that section of the population, the general population that the comparison should be made and I think, as I say, that even now the full seriousness is not appreciated. I do not know how you approach that.

Mr. CAMMOCK. The actual figures go a lot further if you take the aspect of 48,400 people actually served on the ground in the Gulf and if you look at the illness amongst the people, the figures are a lot higher percentage-wise.

Mr. SHAYS. Thank you. Mr. Perot, you have the floor for ten minutes to ask questions.

Mr. PEROT. I would like to ask the people who took the vaccinations, did they ever show you what was in the phial?

Mr. CAMMOCK. No.

Mr. PEROT. It was "Come in and have a shot" and never read the detail. The anthrax vaccination in our country is not approved by the Food and Drug Administration and under our laws it would only be administered with consent; but some people had a shot and that was it. It was the delay between the inoculations and I assume were you ever informed of all of this?

Mr. RUSLING. Nothing. In fact we had nicknames for them. The MoD had nicknames for them.

Mr. SHAYS. By the way, we cannot answer by a nod of the head, it has to be vocal.

Mr. RUSLING. There were nicknames for the vaccine which was "gutter" and the anthrax was, I can't remember biologically, sorry I can't remember the other one but we had nicknames. When I was advised in 1996 that things were classified secret, Mr. Perot, I did not give my consent to it, being classified.

Mr. PEROT. You took some of them with the American troops?

Mr. RUSLING. That's correct.

Mr. PEROT. And, like everyone else, you stood in line and took the shot?

Mr. RUSLING. Yes.

Mr. PEROT. Then you found out later that was the attitude in our country. We had to do that because I do not think the military, the line officer is not the medical officer who understood the risk of the mercury and so on and so forth. Now how about pyridostigmine bromide?

Mr. RUSLING. Yes, I certainly stopped taking pyridostigmine bromide, I could not stop passing water every twenty minutes and I was doing twelve hour shifts.

Mr. PEROT. Did anyone tell you exactly how you were supposed to take it and when?

Mr. RUSLING. We were supposed to take 50 mgs three times a day.

Mr. PEROT. Alarms go off and they start taking it?

Mr. RUSLING. Well, what I don't understand, we were told to take it once or three times a day, but the alarm would go off and officers would come into the tented areas, mealtime or whatever, saying "Take that now." The junior ranks were taking 30 tablets on top of the prescription of what they are advised to take so they were overdosing.

Mr. PEROT. What pesticides were used in your groups?

Mr. RUSLING. Yes it was pentiphylon.

Mr. PEROT. We say Weslon D.

Mr. RUSLING. Dytoxin.

Mr. PEROT. Your uniforms were impregnated also with this?

Mr. RUSLING. Yes.

Mr. PEROT. So, you had the same basis—

Mr. RUSLING. And there was mylithium in the casualties which again we did not know.

Mr. PEROT. Was there much incidence of wives who became ill shortly after the husbands came back?

Mr. RUSLING. A lot of wives complain of gynaecological problems but we do not know the extent.

Mr. PEROT. But, they started after Desert Storm?

Mr. RUSLING. Yes, I have a lot of wives complaining of burning semen and gynae problems which started after the husbands returned from the Gulf War.

Mr. SANDERS. Just for the record, maybe you can help me and see what kind of information we have on this. This is my understanding in terms of ALS. We have 700,000 troops and my understanding is that 16 of our veterans have been diag-

nosed with ALS out of 700,000. Here you had 60,000 people in the Gulf and you have eight diagnosed which suggests that proportionately the number here is greater than the US.

Mr. CAMMOCK. It is possibly true but not all of the veterans in the US, not all 700,000 have actually been checked.

Mr. SANDERS. Sure, but as it stands right now, the proportion of ALS victims in the UK is substantially higher?

Lord MORRIS. Yes.

Mr. RUSLING. I think Professor Hooper will speak about that.

Mrs. THOMPSON. I was going to say the number of ALS/Motor Neurons Disease is very small so although there may be some veterans who are perfectly well now there may be something going on and in a few years' time they will show Motor Neurons Disease. Nigel was diagnosed in 1993. He had various tests. It was not this, that or the other, so unfortunately it must be Motor Neurons Disease.

Mr. SANDERS. And the point you made earlier, this is an older person's illness.

Lord MORRIS. Yes, it is not a young person's illness.

Mr. PEROT. Do you receive any benefits at this point?

Mrs. THOMPSON. I receive a widow's pension. They recognized it was for war service. I receive a Gulf War pension.

Mr. PEROT. I have one suggestion in terms of how to get from where you are to where you want to be because our government was exactly in the same position. Since our countries are very close and we continue communications all the time, I think if there were ways to link your Prime Minister and our President in a conversation on this subject and your Head of what we call the Veterans Society—what do you call it?

Flight LIEUTENANT NICHOL. We don't really have one, not in the same way you have in America.

Mr. PEROT. It is the MoD?

Flight LIEUTENANT NICHOL. Yes.

Mr. PEROT. We are moving forward now in a very powerful and constructive way to solve this problem and I think if they shared the experiences this could do a lot to get things moving quickly. I think if your group understood it is a great opportunity to say that is good we should do it and understand what we are now doing in our country in terms of research and that sort of thing; it was postponed for some years. You have problems here and I know this is right in your hearts. You do not want it left, you risk your lives to go out and get them and in this case it is a subtle thing, we want to be back. I am certain once people fully understand that and you take the proper actions and the tremendous benefits that will come to the world and the people of Great Britain from knowing how to protect people and how you have that sense with vaccines and all the rest, I challenge that really you say what is the nature; whatever the status quo is, we maintain the status quo. We have to head for change and that is what you are working so hard to do and anything we can do to help in a constructive way we will. I cannot tell you how much I admire you for your integrity and your courage and I salute you on behalf of America. These people gave their lives for their country and we are so depressed and defeated by the fact that our country turned their back on the people that they committed suicide. That was terrible, because they were wounded, left behind and we won't do that and I'm sure your country won't do that and because of you we want to make it better. God bless you.

Mr. SHAYS. Are you all done? Thank you, Mr. Perot. It is helpful those questions were put in the record. Mr. Sanders, you want to make a point?

Mr. SANDERS. I am unclear how the British government is compensating those people made ill. In general if somebody has ALS now in the UK, are they compensated? Is it a compensable illness or just an individual situation, the government makes a judgment?

Mr. RUSLING. From what I have seen, if there is something that is not right for the people and they can get away with paying them 20 percent pension, they will do so. That is one of the saddening factors.

Mr. SANDERS. So they are fighting for their rights?

Mr. RUSLING. Many people are so tired mentally and physically, many have committed suicide and attending MoD assessment programs was the final straw.

Mr. CAMMOCK. Even when you have been diagnosed and compensated with a war pension you still have to have a two year review and that is a complete new medical from scratch and the person who does the medical on you has no indication what your previous medicals were or previous documents. He comes with a blank piece of paper. You can be fine one day and the next day dying.

Lord MORRIS. I think Congressman Sanders' question as well is about our arrangements for war pensions, the war pensions legislation. If a condition is accepted

as war-related, if he dies, his widow is a war widow. It is that kind of thing you want to know more about.

Mr. RUSLING. Only if he dies of the illness attributable to service. He must die of conditions or he won't get that grant.

Mrs. THOMPSON. You don't get a war pension unless it is over 80 percent.

Lord MORRIS. In my own case my father died, he was very badly gassed, he lost a leg and he lost an eye. He died of heart failure and my mother was told she was not a war widow because he did not die from a war-related condition. I changed the law to the effect that anyone who died of a cardio-thoracic illness who had served in a conflict where gas was used as a weapon of war would be given the benefit of the doubt. In other conflicts, going back to the First war, benefit of doubt has been given. How much benefit of doubt has there been recently?

Mrs. THOMPSON. The benefit of doubt only the last seven years. After the date of your first claim. After that seven year period it goes to prove that your illness is relative to your service and with the amount of documentation we have from the Gulf there is no chance.

Mr. RUSLING. Everything has been destroyed. All the vaccinations records have been destroyed, where you went from A to B. Everything has disappeared mysteriously.

Mr. SANDERS. Many of these illnesses take many, many years to show the symptoms.

Mr. PEROT. We had all these problems in the United States. When I first had a person with ALS, you call it Motor Neurons Disease but it is the same thing, contact me, I went to retrospective researcherrs and they said, "We need to look at this." I said, "We will do the research, let's just have the records." "We can't do that it would be a violation of confidentiality." I said, "Right, go to everybody who has this and ask them to volunteer." "Oh no, we can't do that." We have been through this phase. Here is the exciting phase. You have to have people at the top who understand the real world and once they see, when it starts happening in our administration replacing the people who had been so stressed ever since the war was over and then you have people with open minds to look at the fact even those papers have all the same problems, it is really heartbreaking that we do not have all the detail but we can have vaccinations, real patterns there but I am an optimist and obviously you are because you keep fighting for what you believe in and I really believe with the things going on here in parliament we are going to see, if you continue the good fight, you are going to see some very, very positive things happen.

Mr. SHAYS. I am going to claim back the floor. Usually what we do in Washington is when somebody else takes the floor we call it a deal but I am interested to know about Khamisiyah. We were told in the US that our troops were not exposed to offensive chemical weapons and we kept hearing the word "offensive". We had a witness coming to testify that troops were exposed to chemical weapons at Kyamisiyah, he had a video of our troops, taken shots of the shells and rockets. When our Department of Defence learned that, on Tuesday the week before that we were going to have this hearing and have his video tape, on the Friday at 12:00 o'clock they announced there would be a press conference at 4:00 o'clock. They said our troops were never exposed to offensive chemical weapons but might have been exposed to defensive chemical weapons. In other words we had blown them up and the fact was our Department had known this for a period of time and had not disclosed it.

We tried to imagine who it originally was, it was 2,000 and 5,000 and then potentially close to 100,000 of our troops and by the way when I say "our troops" I mean our coalition of troops exposed. I thought in one sense we can't be here. We are here trying to help veterans and particularly our American veterans but also those veterans who fought side by side with us and we fought side by side with them. So do you ever have that feeling when you walk out on ice and you think it is rather thin? Are we treading on thin ice in terms of our injection of what we have learned and sharing it with what you are learning in your country?

I would say in our country we are a little ahead. We think we have gone to the point where the momentum is turning to the veteran; I am not sure that is the case in the UK, but it will be the case if you continue to speak out. I am struck by a comment we had in the United Air Force, Major Michael Donnelly. He is a gentleman who is still alive with ALS. He came before our Committee and recounted a now all to familiar litany of official refusals to connect his illness with military service and he was at one time a robust military pilot and there is a previous picture of his two children on either side of the wheelchair. He is not robust anymore. He came before us hardly able to speak, his wife one side and father the other. He looked at us and in a quiet voice said, "I am not the enemy." You triggered that because you almost with you and your husband were deciding whether to in a sense, to challenge your government; it was almost if you did you would be viewed the

same as he was. Imagine a witness of any country coming to his elected officials and saying, "I am not the enemy."

I am interested to know, Mrs. Thompson, if there is one thing that could happen in the UK that you would like to see happen in your country, what would that one thing be?

Mrs. THOMPSON. I think it would be if we could have complete honesty from now on. Right from the beginning people in the MoD did not want to listen to us. We would not go there and be a pain to them, but we continued to fight and gradually we have made tremendous progress. As you said yourself, we feel that it is turning in the veterans' favor in America and I think it would be really something if we could feel that it was happening that way over here and maybe if we continue, that will happen.

Lord MORRIS. On your point about Khamisiyah, I was told by the then Minister for the Armed Forces, I think in 1995 in the House of Commons that only British servicemen could possibly have been exposed to the plume after the destruction of the Iraqi chemical arms dump. Paul Tyler was told fairly recently, last month, that the MoD now estimate it could be as high as 90,000. That is an enormous difference. That is the position here. It could be as high as 90,000 people exposed to those nerve agents because of the bombing of the Iraqi chemical arms dump in South Iraq.

Mr. SHAYS. I am going to conclude my questions and if no one else has questions, we are going to the next panel; but as with each of the panels, is there something that you wish we had asked that you are prepared to answer, something you want to put on our record? Is there any final point that you think needs to be made?

Mr. CAMMOCK. I would like to say one thing with reference to the bromide tablets that were talked about earlier on. One of the problems in the Gulf was the bromide tablets. You were given a handful of tablets and ordered to take them on a regular basis. When it came to people working on shifts, working 12 on, 12 off and if they happened to be sleeping at the time, they would probably, as in most cases happened, took their bromide tablets prior to going to sleep. When the alarm went off and they jumped out of bed, the order came from the NCO or officers, "Take your tablets now" and they would be taking tablets again. In some cases it could only be a matter of hours before they took the previous one. So, the three doses a day did not occur on a regular basis.

Mr. SHAYS. My theory was if two, three or four would be better, I tried that on my lawn and ended up with a pretty brown lawn, but that was not my life and we do know we have testimony that when the alarms went off, some of our military personnel did more than was required and they did as you pointed out, Mr. Perot, at the wrong time in the heat of the battle. Any point you wanted to make?

Mr. RUSLING. I would like to confirm what has happened during the Gulf War, our soldiers from both sides need to know if they go to war they are going to get proper medical care and proper assistance should they be ill. This should not happen to the next generation of servicemen, the war on terror and we need to know that there are proper ways for medicals and it won't happen again.

Mrs. THOMPSON. I would just reiterate Nigel maintained he would not be alive to see the results of an independent public inquiry. I just fear how many more veterans will also not be around to see the beginning of this public inquiry, let alone the conclusion of one.

Flight LIEUTENANT NICHOL. I think it has all been said, Congressman Shays. So, thank you, Mr. Perot, thank you as well. I hope in five or ten years we are not still talking about it.

Mr. PEROT. You won't be. We were exactly where you are today. Is that a fair statement?

Mr. SHAYS. That's a fair statement.

Mr. PEROT. But once our leaders solve a problem and you say, Who is keeping this going? It is career employees. Once our leaders saw what was really happening they took the leadership role. You can do the same thing but you need to keep up the good fight, make sure they get all the information that you see.

Mr. CAMMOCK. In 1997 I spoke to your Committee in Washington. Since that date nothing has changed, not one iota has changed of any research or any of the government.

Mr. SHAYS. If it is any consolation to you, what you said to the Committee made an impact in the US and had an impact on the veterans in the US and we were grateful for those points. I am going to conclude by saying to you all that tomorrow I have an opportunity to address some members of parliament. I am going to repeat your requests of all the things you could ask for, you ask for honesty. What a beautiful thing to ask for and what an easy thing to comply with. This part of the hear-

ing is over and we will have a break with the panel. We will take a two minute recess.

[Recess.]

Mr. SHAYS. I would like to call the Inquiry to order and welcome our guests, our witnesses as well and I am requested we speak as loudly as we can. To welcome and introduce our second panel we have Patrick Allen, senior partner of Hodge Jones Allen, leading solicitor on compensation payments for Gulf War veterans. We also have David Laws, Liberal Democrat MP with constituents who have suffered many serious illnesses they attribute to serving in the Gulf. We were going to have the Countess of Mar, I think she is not as well as she needs to be to be here today and we have Paul Tyler, a member of parliament on the effects of organophosphates and other issues relating to Gulf War illnesses.

We are going to invite each of our witnesses to submit whatever statement they want for the record. It will be submitted and made on the record and if they want to make additional comments they should feel free and we thank you for your patience and are grateful that you are here. Mr. Allen, you have the floor as we say in the US.

STATEMENT OF PATRICK ALLEN, SENIOR PARTNER, HODGE JONES ALLEN; HON. DAVID LAWS, LIBERAL DEMOCRAT MEMBER OF PARLIAMENT; AND HON. PAUL TYLER, MEMBER OF PARLIAMENT

STATEMENT OF PATRICK ALLEN

Mr. ALLEN. Thank you for this opportunity of addressing you this morning. I have prepared a memo which I have submitted which I hope you have and I will try to summarize the main points of that memo in a few minutes.

My law firm in Camden, London has a contract with our government, with the Legal Services Commission to carry out investigations into Gulf War Illness compensation claims. The legal position in this country is that UK servicemen and women have a right to make a claim against the government for personal injury or death by negligence or other torts in relation to events which take place after 1987. This followed a change in law after that time. Claims are made in the normal way through the courts and there are many claims.

My firm acts personally for about 600 veterans and we coordinate the compensation claims for about 2,000 veterans altogether. We have a team of two full time advisers and they carry out all the relevant research and look to report papers from all round the world relating to the Gulf War. We have carried out a limited number of tests and we have considered and are considering all the suspected causes of Gulf War illness which you mentioned this morning.

Recently the MoD has set up an investigation into depleted uranium and there is a DU Oversight Board which meets in order to oversee those investigations and we have a member on that Committee. Obviously, we cannot disclose the results of our inquiries because that is covered by legal professional privilege but no proceedings have been issued in the English courts at this moment against the MoD, with the general extension of time given by the MoD.

There is limited no fault financial compensation available to Gulf War veterans in this country. They are entitled to apply for a war pension under the War Pensions Scheme administered by the War Pensions Agency if they are injured or become ill in the course of military service. There has to be a causal link between injury or disability and service in the armed forces. For claims made within seven years of leaving the service, the burden is on the Secretary of State to show the disability is not linked to service but I think you will see the benefits under the scheme are very modest and for 100 percent disablement the payment shows £6,250 disability level.

Around 53,400 member of the UK armed forces served in the Gulf War conflict. About 2000 of these have notified the MoD of their intention to claim compensation for Gulf War illness and as at September, 2001, 1231 applications had been made for war pensions by Gulf veterans and of those 1038 had been granted.

In my paper I summarize the international state of epidemiology in the Gulf War illness which I think we are all aware of. There have been many studies carried out in the UK, Canada and US that have all roughly come to the same conclusions. They have studied Gulf War veterans and compared them with those who have not been in the Gulf and found that those who served in the Gulf suffered two to three times more than those who did not. It is remarkable how many of them come up

with incredibly similar results. Simon Wessely has reviewed the cases in a paper in January, 2001 and he says and I quote:

"There is a health effect and it is not trivial. It is not due to selection bias."

The fact that people are coming forward and filling out their own questionnaire, there is a general health effect. Our approach recently has been firstly to attempt a mediation of Gulf War claims against the MoD and with the time and expense involved in a full-blown court case. We therefore made an approach to the MoD to consider setting up a mediation which is the form of alternative dispute resolution which will be on a local basis and consider not just compensation claims but all the matters of concern to veterans.

Now, unhappily, that approach was eventually rebuffed. There was considerable correspondence with the Prime Minister and his Ministers. Lord Morris assisted us with that correspondence. At one time we thought the matter was going to be considered favorably but at a meeting with Dr. Moonie in March, 2001, he said there would be no discussions along these lines, this despite the fact at about the same time in March, 2001 the Lord Chancellor issued a press statement on behalf of the UK government saying all departments would use mediation and dispute resolution as a means of settling claims brought against government departments.

However, the Prime Minister clarified the matter in May, 2001 in a letter to Lord Morris:

"The MoD is very happy to discuss these issues (DU) or other issues with veterans or their legal representatives. I know that HJA attach importance to dealing with matters of dispute which go beyond the issue of liability and compensation."

—and that they would be happy to have discussions with us on the basis that there is no legal liability for Gulf War veterans. We embarked on some meetings on issues. It appeared as long as we did not talk about compensation and we had two meetings, one was to highlight concerns about the veterans about the administration of the pension scheme itself, there were great worries, it worked in a slow unreliable way, inconsistencies with the decisionmaking and we discussed this with the Head of the Pensions Agency and that did result in some helpful moves and some of the problem cases were dealt with.

We then had a meeting with MoD officials to talk about the Gulf Veterans Medical Assessment Program. You may know the GVMAP was set up by the MoD to make an assessment of Gulf veterans who were not well and this has been going on since 1994. Something like 2000 Gulf veterans have been seen and they h ave found that many are not well, in fact about 20 percent are not well. What we have been concerned about is there is no follow-up for those who are not well. This is simply an assessment and the results of the assessment are sent to the veteran's doctor and it is up to the British NHS to take over any relevant treatment at that point.

We are aware that the Americans have taken a different tack on this and we have been carrying out a detailed search to discover the best treatment for Gulf War veterans. There has been a lot of research into this issue and the IOM have issued a paper highlighting what they think are the best treatments for the symptoms which Gulf veterans display, including chronic fatigue syndrome, depression, fibromyalgia et cetera and they remark on the use of behavioral therapy and exercise. I have quoted in my paper what the IOM say they believe the Veterans Agency should:

"Provide specific training to health care providers caring for Gulf War veterans to ensure that they are skilled n the principles and practice of patient-centred care and ensure that healthcare practitioners serving Gulf War veterans are allowed sufficient time with patients to provide patient-centred care."

No such advice has so far been given to us and this is a matter of great concern to us. The NHS is the treatment area and there is no military expertise, no coordination, only fragmentation and variation across the country and we consider that the option of treating veterans in the NHS is likely to fail. They are not likely to have the expertise or resources to tackle the problems of behavior therapy.

We consider that the way forward is for the MoD to set up a Veterans Assessment and Treatment Center working with the NHS which will provide the treatment needed. I quote in my paper what Bruce George said in January:

"Therefore we have to look to treat, largely in a sympathetic and symptomatic manner. Symptomatic treatment where there is no identifiable cause is all that is available to us."

We thought we should call for a public inquiry. We believe that only a public inquiry will allay the fears of veterans and the public that all relevant evidence has been properly examined. There has been a history of delay and secrecy on the part of the government in the investigation and treatment of Gulf War illness which has resulted in a loss of trust and confidence among veterans. Conspiracy theories are

common. We hope that a public inquiry will establish where the truth lies in relation to facultative illness and the alleged causative factors and will highlight the best way forward for treatment. We made a formal request to the Prime Minister recently. That was rejected too.

[The document, "Memo by Hodge Jones & Allen," follows:]

MEMORANDUM BY HODGE JONES & ALLEN

TO THE US Congressional Subcommittee on National Security, Veterans Affairs and International Relations Hearing on 18th June 2002-06-14

I am the Senior Partner of Hodge Jones Allen, Solicitors, of Camden Town, London NW1. My firm of around 160 staff deals with a wide range of claims including personal injury and clinical negligence claims. I am President of the Association of Personal Injury Lawyers, an organisation with 5300 members, who act predominantly for the victims of accidents.

Since 1998, my firm has had a contract with the Legal Services Commission (formerly the Legal Aid Board) to carry out investigations into Gulf War Illness compensation claims. The position of servicemen and women in this country is that they have a right to bring legal action against the government for compensation for personal injuries or death caused by negligence or other torts in relation to events which take place after May 1987. This followed the repeal of Section 10 of the Crown Proceedings Act 1947 by S1 of the Crown Proceedings Armed Forces Act 1987. Claims are brought in the normal way through the courts. The burden of proof in any case is on the claimant.

My firm acts personally for around 600 veterans and co-ordinates the Gulf War claims for around 2000 veterans.

My team includes two full time scientific advisors who analyse all relevant research reports and papers from around the world concerning Gulf War illness. We have carried out some limited tests on a small number of veterans in a pilot study. We are considering all the suspected causes of Gulf illness, including depleted uranium, multiple vaccinations, chemical and biological weapons, pyridostigmine bromide in NAPS tablets (nerve agent pre-action sets), the use of organo-phosphates, smoke from burning oil wells, psychological stress.

We have a representative on the DU Oversight Board which was set up by the MOD in 2001 to oversee the setting up of tests into depleted uranium and the testing of veterans for depleted uranium and its effects upon them.

We cannot disclose the result of our enquiries which are covered by legal professional privilege.

No proceedings have been issued in the English courts against the MoD. A general extension of time has been granted by the MOD in relation to Gulf claims so that claims will not be out of time when issued.

Over 2000 Gulf veterans have notified the MOD of their intention to claim compensation for Gulf War Illness.

There is limited no fault financial compensation available to Gulf veterans. They are entitled to apply for a War Pension under the War Pensions Scheme administered by the War Pensions

Agency if they are injured or become ill in the course of military service. There has to be a causal link between injury or disability and service in the armed forces. For claims made less than 7 years from the event causing the injury, the burden of proof is on the Secretary of State to show that the disability was not linked to service. For disability of 20% or more, the claimant will receive a tax-free pension of £1250 pa for 20% rising to £ 6250 pa for 100% disablement. According to government figures, 80% of pensions are at the 50% rate or below. It will be clear that these payments are very modest and cannot replace the earnings of a Gulf War veteran who is unable to work.

Extent of Gulf War Illness

Around 53,400 members of the UK armed forces served in the Gulf war conflict. About 2000 of these have notified the MOD of their intention to claim compensation for Gulf war illness. As at September 2001, 1231 applications had been made for War Pensions by Gulf veterans and 1038 had been granted.

Epidemiology

There have been a number of epidemiology studies into Gulf war illness. Studies up to the year 2000 were summarised in the report of the US Institute Of Medicine of 2000 (Fulco and others). The studies included:

Unwin and Ismail (Lancet Jan 1999;353 :169-78)
Survey on 4248 Gulf vets, 4250 Bosnian vets and 4246 vets who did not deploy to the Gulf. The Gulf cohort reported significantly more symptoms of fatigue, PTSD, psychological distress than the other control groups. The authors concluded that service in the Gulf was associated with various health problems over and above those associated with deployment to an unfamiliar environment

Iowa Study 1997 (JAMA 1997;277:238-45)
This study looked at a representative sample of 4886 military personnel and was representative of 29,000 military personnel. Four groups were examined, two had been deployed to the Gulf war and two were not. The two groups of Gulf War military personnel reported roughly twice the problems of symptoms suggestive of the following conditions: fibromyalgia, cognitive dysfunction, depression, alcohol abuse, asthma, post-traumatic stress disorder, sexual discomfort or chronic fatigue. Gulf War veterans displayed significantly lower scores across scales for physical and mental health. In summary, this large, well-controlled study demonstrated that certain set sets of symptoms are more frequent and quality of life is poorer among Gulf War veterans than among non-deployed military controls.

Goss Gilroy Canada 1998
3113 members of the Canadian forces deployed to the Gulf were compared with 3439 Canadian forces deployed elsewhere during the same period. Deployed forces had significantly higher rates than controls of self-reported chronic conditions and symptoms of

a variety of clinical outcomes - chronic fatigue, cognitive dysfunction, multiple chemical sensitivities, major depression, PTSD, chronic dysphoria, anxiety, fibromyalgia and respiratory diseases. Gulf War veterans also reported significantly more visits to healthcare practitioners, greater dissatisfaction with health and greater reductions in recent activity because of health
red to controls.

Cherry and others (Occup Environ Med 2001;58:291-8)
4795 Gulf veterans and 4790 non-Gulf veterans. Questionnaires administered with 95 symptom questions. Gulf war vets reported a higher severity of every symptom than troops not deployed to the Gulf. Five factors were significantly worse – psychological, peripheral, respiratory, gastrointestinal, concentration.

The studies have come up with remarkably similar findings in the UK, Canada and in the USA – veterans deployed to the Gulf report significantly more adverse health effects than non-deployed veterans. The symptoms are genuine – we have large numbers of Gulf veterans who are not able to function normally, this affects their ability to work and their family life. The studies have been peer reviewed.

Simon Wessely and the Kings College Gulf War Research Unit concluded in a review article in January 2001 Ten years on: What do we know about Gulf War syndrome? (Clinical Medicine Vol 1 no1)

> "There is a health effect and it is not trivial. It is not due to selection bias."

Mediation of claims

In view of the legal and scientific complexity of Gulf War illness claims against the Ministry of Defence and the time and expense involved in a court case, we considered that an approach should be made, with the assistance of mediators, to the government to consider "alternative dispute resolution" by mediation of all Gulf War illness claims.

On 27th February 2001, the Prime Minister wrote to Lord Morris of Manchester setting out his comments on a number of aspects of Gulf War Veterans and their claims. The Prime Minister stated:-

"I understand that a Ministry of Defence Representative recently met a representative of the lead solicitors for the potential litigation, Hodge Jones & Allen, to discuss on a without prejudice basis a proposal put forward by HJA for mediation in these cases. This is now being carefully considered by the Ministry of Defence".

We requested a meeting with the Minister. This was agreed to and a meeting took place on 21st March 2001 with Dr Lewis Moonie, an Under Secretary of State at the MoD, who has

been given specific responsibility for veterans' affairs.

Dr Moonie was not prepared to allow a mediation of claims by Gulf veterans. He said that his new responsibilities meant that there would now be better co-ordination of problems effecting Gulf veterans and we would be invited to make representations to this unit.

On the 23rd March 2001, two days after the meeting with Dr Moonie, the Lord Chancellor issued a press statement which stated that all government departments would in future use mediation and alternative dispute resolution as a means of settling claims brought against government departments. This appeared to be in conflict with the stance taken by the MOD.

The Prime Minister clarified the position in a letter dated 21st May 2001 to Lord Morris

> *the MOD is very happy to discuss these issues (DU) or other issues with veterans or their legal representatives. I know that HJA attach importance to dealing with matters of dispute which go beyond the issue of liability and compensation. The Ministry of Defence will discuss any such agenda with HJA on the understanding that the Ministry of Defence currently except no legal liability for the illnesses of Gulf veterans.*

The MOD therefore approached us to set up some meetings on Gulf war issues **other than** compensation

Pensions Meeting 17.9.01

A meeting took place with the acting head of the War Pensions Agency – Alan Burnham, and MoD officials on 17th September 2001. The meeting discussed anomalies and problems with war pension applications and appeals by Gulf veterans.

It was agreed that we should set up liaison to deal with bad cases of delay or anomalies and a dossier of such cases was sent after the meeting and a follow visit to Norcross was arranged.

We have since been informed that some cases out of a problem dossier have been successfully reviewed by the WPA and backdated war pension paid.

Meeting to discuss Gulf Veterans Medical Assessment Programme (GVMAP or MAP) 9.1.02

Our concern was and is the failure of the MOD to provide any treatment or rehabilitation for those who suffer from Gulf War illness to enable them to return to work or lead more fruitful lives. Many of the veterans are extremely disabled and may never work again.

The Gulf Veterans Medical Assessment Programme (GVMAP) has seen over 2000 veterans since it began in 1994. However GVMAP simply carries out an assessment of the veterans' present state of health. The assessment is then sent to the veteran's GP and no further action is taken by the MOD.

At the meeting Professor Lee explained that MAP has seen 3265 Gulf veterans for assessment since the start of the programme in 1993. Veterans are seen at St Thomas Hospital in London or at North Allerton which is more convenient for those who live in the north. Up to 2 hours is spent on the assessment. Tests are then carried out and the results come back within 7 weeks. MAP then writes an assessment. If treatment is required, they write to the veteran's GP. All further treatment is given by the NHS in the area where the veteran lives, and not through any specialist agency.

In a report of 2001 analysing the second 1000 veterans examined GVMAP, it was confirmed that 20% of the veterans were not well

The MOD has carried out no follow up of those assessed by GVMAP so has no idea what has happened to the 20% of veterans that it acknowledged were ill as a result of its assessment. The MOD here appears to have no interest in treating veterans or providing rehabilitation

The Americans have taken a very different tack. They have been carrying out research to discover the best treatments for Gulf veterans. The prestigious Institute of Medicine has produced a paper setting out recommended treatments for Gulf veterans which will now be implemented by the American Veterans Agency

US Treatment of Veterans

US commentators and researchers have for some time been turning their attention to suitable treatments for ill Gulf veterans, regardless of the causes of their symptoms. A leading article by Hodgson and Kipen – 1999 Journal of Occupational Environmental Medicine

> *The quest, which is perhaps ultimately futile , for etiology is critical in addressing preventive recommendations for future deployments, but it also may be seen as a diversion of attention and resources from the hard work of healing those with symptoms today.*
>
> *.....Cognitive behavioral therapy and other management techniques for chronic and medically untreatable symptoms can be applied to individuals whether they have a chronic fatigue like syndrome, a somato form disorder or a need to adjust to chronic disability from nerve gas exposure. Especially for the latter, no other treatment is currently appropriate or available.*

The authors recommended randomised clinical trials of Cognitive Behaviour Therapy to be carried out by the Veterans Agency.

In 1998, two treatment trials for Gulf veterans were set up in the USA by the Department of Veterans Affairs. Eligible patients had to have two out three of the following symptoms - fatigue, musculo-skeletal pain, and cognitive disfunction. One trial called "EBT" , (exercise-behavioural therapy) , covered 1092 Gulf veterans. It was found that aerobic exercise and/or CBT (cognitive behaviour therapy) did lead to significant improvements in mental health. Aerobic exercise with or without CBT led to significant improvements in fatigue and memory problems.

A report on this trial is contained in the evidence given by John Feussner to US Congress on 24th January 2002.

The US Institute of Medicine

The US Department of Veterans Affairs was charged by S105 of the US Veterans Programme Enhancement Act 1998 to ask the Institute of Medicine to convene a committee to identify a method for assessing treatment effectiveness and describe already validated treatments for Gulf war veterans health problems including the problem of medically unexplained symptoms.
The specific charge of the committee was to:

> identify and describe approaches for assessing treatment effectiveness
>
> identify illnesses and conditions among veterans of the Gulf War
>
> for these identified conditions and illnesses, identify validated models of treatment (to the extent that such treatments exist) or identify new approaches, theories or research on the management of patients with these conditions if validated treatment models are not available

The IOM paper on treatment for Gulf veterans published in 2001 – "Gulf War Veterans Treatment of symptoms and syndromes" recommends the following treatments for specific post Gulf complaints:

Chronic fatigue syndrome:
Cognitive behavioural therapy and exercise therapy

Depression
a combination of antidepressant medication and psychotherapy (either cognitive behavioural therapy or interpersonal therapy)

Fibromyalgia
that the results of treatment studies of physical training, trycyclic antidepressants and acupuncture should be further monitored
that treatment with opioid analgesics and glucocorticoids should not be given

Headache
pharmacological management of acute episodes

Prophylactic pharmacological management for headaches that occur frequently or are disruptive to the patients functioning
Thermal biofeedback
EMG feedback
Use of behavioural and physical treatments including relaxation training and cognitive behavioural therapy

The IOM goes further and states that the Veterans Agency should:

> Provide specific training to health care providers caring for Gulf War veterans to ensure that they are skilled in the principles and practice of patient-centred care and
>
> Ensure that healthcare practitioners serving Gulf War veterans are allowed sufficient time with patients to provide patient-centred care.

No such advice has so far been given for the treatment of UK veterans inside or outside the NHS.

It will be seen that Cognitive Behaviour Therapy is considered to be very effective and has achieved significant results to improve mental health, fatigue and memory problems.

We consider that the option of treating veterans for Gulf War illness in the NHS is likely to fail. The NHS is unlikely to have the resources or expertise to tackle such a difficult problem. Cognitive Behaviour Therapy involves many hours of sessions with trained counsellors, typically 16 sessions to produce results. There is no military expertise for dealing with war syndromes in the NHS and any provision in the NHS is likely to be fragmented or non-existent.

We consider that the way forward is for the MOD to set up a Veterans Assessment and Treatment Centre where they will recruit and train suitable experts to give the treatment to veterans which they require, borrowing on lessons learned from the Americans. Failure to provide such treatment may well give rise to legal action which we are currently investigating.

Bruce George, Chairman of the House of Commons Defence Select Committee said in evidence to your committee in January 2002

> "The highest priority now is to try to deal with the symptoms of ill health which the veterans suffer by providing care and treatment which will improve their quality of life. It may not be possible to at present to cure such illnesses but maximum efforts should be made to identify treatments which will reduce their effects".
>
> therefore we have to look to treat, largely in a sympathetic and symptomatic manner. Symptomatic treatment where there is no identifiable cause is all that is available to us ... ...

We feel that the time has come to bring the MOD to account to provide the treatment which will improve the lives of Gulf veterans. Paying a pension for life for disability is not the only answer. It is extremely important to improve the lives of veterans by improving their health with recognised techniques. Such techniques will require resources and experienced personnel. Under present circumstances we consider it highly unlikely that such treatment can be provided by the NHS.

Public Enquiry

We support the call for a public enquiry into Gulf War illness. We believe that only a public enquiry will allay the fears of veterans and the public that all relevant evidence has been properly examined. There has been a history of delay and secrecy on the part of the government in the investigation and treatment of Gulf War illness which has resulted in a loss of trust and confidence among veterans. Conspiracy theories are common. We hope that a public enquiry will establish where the truth lies in relation to Gulf War illness and the alleged causative factors and will highlight the best way forward for treatment. Our recent request to the Prime Minister for a public enquiry was rejected.

Claims by Veterans against Iraqi Assets

We were interested to see that there is a possibility that US veterans will be able to claim compensation for Gulf war illnesses against $1.7 billion of Iraqi assets frozen by the US government. We understand that Congressman Lloyd Doggett will be re-submitting the Gulf War Veterans' Iraqi Claims Protection Act to Congress. This Act was passed unanimously by the House of Representatives in July 1999 but stalled and killed in the Senate. We would like to know whether UK veterans will be permitted to make claims against these funds.

Patrick Allen
Senior Partner
Hodge Jones & Allen

June 2002

Mr. SHAYS. Thank you, Mr. Allen. I was going to call you the Right Honorable but I understand that would be giving you a title you don't yet have?

Mr. SANDERS. We are very generous about those things.

Mr. SHAYS. The Honorable Mr. Laws, it is wonderful to have you here and you have the floor.

STATEMENT OF HON. DAVID LAWS

Mr. LAWS. Thank you very much for the invitation and for the boost to the campaign your being in the country has given us. I have prepared a paper which has been given to you but to bring you up to date I would like to not talk entirely to that paper.

Mr. SHAYS. The entire statement will be put in the record.

Mr. LAWS. I think I should make it clear firstly my reason for involvement in the matter of the Gulf War and that is I am the constituency Member of Parliament for Mrs. Thompson who was here giving evidence this morning and any constituency MP with such a case would take an interest, but I take a particular interest because Mrs. Thompson is such an effective spokesperson over this issue and speaks not only with great passion but great balance and common sense and I am pleased to support her today. There are four points:

The first point is why do we need to get to the bottom of this issue? For Sam it is to get to the bottom of the issue and what caused the death of Nigel. I think the other reasons have been touched on. Knowing the causes of Gulf War illnesses would assist in treatment, on compensation and help us avoid these problems in the future for serving members of our forces, for British and US who are at present serving in such places as Afghanistan.

Secondly, to highlight the very poor record of successive governments in getting to the bottom of the issue. This is not a party political issue in the country. Successive Defence Committees in the House of Commons have commented on the very poor record of the MoD in getting to the bottom of this issue and the year 2000 report of the Defence Select Committee summarizes the very poor record of the MoD and it draws attention to the 1995 report of the Defence Select Committee and that report stated:

"In responding to the allegations of a Gulf War syndrome MoD has been quick to deny but slow to investigate...MoD's response has been reactive rather than proactive and characterized throughout by scepticism, defensiveness and general torpor."

In the Defence Committee's 1997 report, concern about the way in which the MoD was pursuing the matter was reinforced when the Committee stated:

"We do not feel that the Ministry of Defence has been dogged in pursuit of the facts."

Even the recent report expressed concerns about the way this matter was being dealt with and drew attention to the fact that veterans and veterans' families do not have confidence in the way the MoD is pursuing this matter and does not have confidence in the department which had overarching responsibility for British troops in the Gulf War investigating its own behavior and responsibility towards the troops. We have a problem we are leaving the department responsible for what happens in the Gulf to investigate its own abilities and that is not a very satisfactory state of affairs.

One other point is relative to recently and that is the experience of Shaun Rusling. You referred earlier on to what was needed from politicians in relation to these issues is honesty, but we see in relation to Shaun Rusling there is a lack of honesty from the government. Mr. Rusling had his appeal by the War Pensions Agency upheld and they proved the fact that he is suffering from Gulf War Syndrome and they criticized very clearly the MoD for amending the diagnosis to change the words Gulf War Syndrome to symptoms and signs of ill-defined conditions. They said in their summing up:

"We know of no basis under legislation which entitles the Secretary of State effectively to withdraw an appellant's appeal by replacing a rejected condition with accepted one."

Therefore, I took a question to the MoD asking them the reasons that they changed the appeal papers of Mr. Rusling and why they ordered them and after a delay, the answer came back that it would appear not all the appeal papers of Mr. Rusling had been presented at the Appeals Tribunal in 1999 and at that tribunal further diagnoses for appeal were identified and this required a new set of papers. This is the kind of obfuscation which gives the MoD a very bad name and we are making in relation to Mr. Rusling's own decision to find out because of the decision of the War Pensions Agency Appeal Tribunal the government will accept the diag-

nosis of Gulf War Syndrome and I asked the Secretary of State for the Defence whether he would make a statement on that issue as to what issue the government is going to take as a result of that fundamental ruling.

I tabled it some weeks ago and on 13th June I received an answer back from the Minister which just said, "I will answer shortly" so we are still left waiting for what the government's response to this very key area is and frankly after 11 years you would have thought we would be more together than that.

The other issue is whether there should be a public independent inquiry on the matter and I think all of us giving evidence think there should be because it is the only way we can get to the truth. In 1994, the Minister of the Armed Forces told the House of Commons he did not want to have an inquiry and the excuse was:

"In the absence of any confirmed scientific evidence that there is a health problem resulting from Gulf service, I do not believe there are any grounds at present for such an inquiry."

So, the argument was that there was no evidence to have—

Mr. SHAYS. Just to interject, if you don't open the door to see what is in the room, you are not going to see the evidence.

Mr. LAWS. Exactly and earlier this year the position of Ministers is still there should not be a public independent inquiry but I was told by Mr. Ingram at the MoD that a public inquiry could not help to answer the question why some Gulf veterans are ill, only continuing scientific and medical research can do that. In fact, there seems to be an acceptance that there is an unusual illness for people who served in the Gulf but the argument is now the inquiry itself could not do the scientific and medical research. That is obviously true but it is wilfully misleading to the person producing that research to make sure it gets done rapidly and on time.

To finish, the Minister for Veterans Affairs in the House of Commons and the MoD also wrote on 8th April and he said:

"The Prime Minister does not believe that an independent public inquiry into this matter is appropriate at this time."

Then I pressed the Minister further to answer in what circumstances would it be appropriate to hold such an inquiry into this matter and I am afraid in relation to the lack of honesty of the MoD, the answer came back:

"If the circumstances were to change, a public inquiry may become the appropriate mechanism."

I don't know if you have civil servants like we have in this country.

Mr. SANDERS. Oh, no, none whatsoever.

[Laughter.]

Mr. LAWS. This is the real equation of the issues.

Lord MORRIS. Since then, David, I have been told that the possibility of a public inquiry being appropriate is not excluded. Those words were chosen with clinical care.

Mr. LAWS. I think you are absolutely right. They are the same words as in 1994. "I do not believe there are any grounds at present for such an inquiry." So, whether it is a door we can kick in or whether it is a form of words to say we should not have an inquiry now is delaying it indefinitely, but thank you for highlighting the issues and rather than ending on a sour note, quoting the MoD, you may have noticed Britain's leading newspaper had an article in which it backed the call for a public inquiry and that is a helpful opportunity.

[The statement of Mr. Laws follows:]

Statement from David Laws MP,
Gulf War Illness Hearing

Petty Officer Nigel Thompson, a constituent of mine, died from motor neurone disease in January this year after a long period in which he played a leading role in the campaign to draw attention to Gulf war illness. He conducted a lengthy campaign for a full independent public inquiry to get to the bottom of an issue that has affected many people who served in the Gulf and could well affect service men in future if we do not deal with some of the underlying problems. After Nigel Thompson sadly died in January, I spoke to his widow, Sam Thompson, who lives in my Yeovil constituency. She confirmed that, despite the tragedy of her husband's death, she is keen to pursue the campaign that he helped to lead for many years to obtain a clear outcome and a full public independent inquiry to establish the facts.

The British Government has played a role since 1997 in seeking to identify the causes of Gulf war illness, a condition now recognised by the Ministry of Defence, even though its causes are still unclear. Nevertheless, it remains totally unacceptable that 11 years after the end of the Gulf war, we have failed to find answers to many of the key questions. My aims in this area are not only to push for a full independent public inquiry, but also to put further pressure on the Government to advance the agenda of medical and other work to make sure that we get to the bottom of what happened in the Gulf in 1990 and 1991. I also believe that the time has come to consider paying no fault compensation to Gulf war illness sufferers.

There are several reasons why it is vital to discover the truth of what occurred. First, we all want to know what happened in the Gulf, particularly friends and relatives of individuals who died as a consequence of a Gulf war illness of one kind or another. Secondly, it is in the medical interest of individuals who served in the Gulf and are still alive. In its 2000 report on Gulf war illness, the House of Commons Defence Select Committee took the view that improving medical care should now be the main focus for Government action. In their words:

> "It may be necessary now to accept that precise causes may never be found and to focus attention instead on improving the current circumstances of ill Gulf veterans."

Whilst I doubt anybody would argue with the key importance of doing our best to ameliorate the suffering of those with Gulf war illness, this argument overlooks the simple fact that gaining a clearer idea of the causes of illness will assist the medical profession's attempts to help those suffering from it.

The Defence Select Committee also seems to ignore another point, that in addition to helping those already suffering from Gulf war illness, thorough investigation will help ensure the safety of our Armed Forces in current and future

deployments, where troops may well come face to face with some of the illness's possible causes.

Finally, although this is not my constituent's priority, many individuals who have experienced Gulf war illness remain concerned about appropriate compensation for their medical problems. All these issues depend on a clear outcome to the investigation that has been going on for many years.

Although I said earlier that the Government since 1997 appears to have taken up this issue, there are certainly doubts not only about the length of time that they are taking to resolve it but also about the performance of the Ministry of Defence, especially immediately after the Gulf War. These issues are relevant to the continuing calls for a full independent public inquiry. I refer again to the report prepared in 2000 by the Defence Select Committee, in which it draws attention to its own 1995 report into Gulf war syndrome. That previous report stated:

> "In responding to allegations of a Gulf War Syndrome MoD has been quick to deny but slow to investigate. . . MoD's response has been reactive rather than proactive and characterised throughout by scepticism, defensiveness and general torpor."

In the Defence Committee's 1997 report, concern about the way in which the MoD was pursuing the matter was reinforced when the Committee stated:

> "we do not feel that the Ministry of Defence has been dogged in pursuit of the facts."

In April 1999, even after the present Government came to power and pursued a more determined approach to the issue, the Minister for the Armed Forces told the Select Committee in evidence:

> "I think there is a worry among the Gulf veterans that not very much is happening."

When we turn to the report that the Defence Committee prepared in April 2000 and read its recommendations and conclusions, we see that the Committee concluded:

> "Although the MoD may have acted correctly from the scientific viewpoint in this respect-"

in relation particularly to the evidence about depleted uranium—

> "the way that it has dealt with veterans' concerns has not been impressive."

There has, then, been concern for some time about the way in which the MoD has taken forward these matters.

A public inquiry would ensure that the scrutiny of the matter is truly independent. The Ministry of Defence claims it can provide this independence through the research it funds, stating:

> All the medical research is independent of the MoD, although we may commission it. It is carried out rigorously and independently. We do not interfere with the conclusions.

It would certainly be shocking if this were not the case. The fact remains, however, that the MoD as paymaster asks the questions it cares to and so controls the agenda of the research it funds. This can be seen in the way in which it refused to look at the possible ill effects of using depleted uranium until – in the words of the Defence Select Committee – 'it became unavoidable'.

Setting up an independent public inquiry would also ensure that there is the determination to see the matter through. Confidence is crucial in this area and this is why the present approach must be questioned. Although much of the current inquiry's somewhat dubious record, including evidence given to the Select Committee prior to 1997 which proved not to be accurate, pre-dates the Government, it has created in many people's minds, and in the minds of Gulf veterans, serious doubt whether the Ministry of Defence can be relied upon to take a sufficiently independent and proactive line in the case. Eleven years have now passed since the Gulf war and during that time many of those who were affected by Gulf war illness have died. That will inevitably lessen the momentum to resolve the matter, which we must not allow to happen.

One issue that has given rise to concern about the cause of Gulf war illness is vaccination and inoculation against chemical weapons that might have been used by those whom we were fighting in the Gulf war. People will inevitably be sceptical of the MoD's ability to assess its own performance, in that the possible causes of Gulf war illness include not just the action that may have been taken by our enemies, but the actions that we may have taken through the use of munitions such as depleted uranium, our inoculation programme, particularly the multiple inoculations, and the use of organophosphates. When compensation would have to fall on a contingency reserve or directly on the MoD budget, there must be scepticism about whether that will influence the ability of the Department as a whole, even if not of Ministers, to see the matter through properly to an end. If the veterans have such a perception, that alone is a major reason to conduct a fully independent public inquiry now.

This lack of trust in the MoD has been further heightened by the case of Shaun Rusling. As many present will no doubt be aware, Mr Rusling is a Gulf War veteran who has recently won a nine-year battle to gain recognition from the

Government that he is suffering from Gulf war illness. Not only was his case subject to torturous delays, but evidence also shows that officials from the War Pensions Agency tampered with his medical diagnosis in order that a pension could be paid whilst keeping up the pretence that it was not for Gulf war illness.

A fully independent public inquiry would have the confidence of veterans in a way that given its history, MoD investigations perhaps will never have. The inquiry should be able to commission work of its own, pursue an agenda that should include a thorough examination of why Gulf war syndrome has occurred, and make recommendations to avoid such a problem in future. It is ludicrous to claim, as the MoD has done, that '[a] public inquiry could not help to answer the question why some Gulf veterans are ill'. This is exactly what it could do and in a proactive and open way, free from the perception of having ulterior motives and more able to retain the confidence of those affected.

The Government have yet to rule out a public inquiry. They say that they are waiting, but I do not believe that we can afford to wait much longer to resolve this matter.

I am proud to have the opportunity to raise this important issue on behalf of a constituent who was himself particularly active in shedding light on it. I am determined, as many others clearly are, to see it through to a conclusion in the interests not only of those who served this country in the Gulf, but of all members of the armed forces who serve us now or will do so in future.

David Laws
Liberal Democrat MP for Yeovil Constituency

Mr. SHAYS. Thank you.
Mr. Tyler?

STATEMENT OF HON. PAUL TYLER

Mr. TYLER. Can I echo the thanks of my colleagues to all your team for giving the opportunity for us to give evidence. As with colleagues here I do not intend to go through all my statement.

Mr. SHAYS. Your statement will be part of the record.

Mr. TYLER. Thank you. What I would like to do is highlight one or two points but in addition I have provided for your counsel something from Hansard, our official record, which I hope may be helpful and I will come to that in a moment.

I am not a medic nor a scientist, I am, like you, an intelligent layman. I happen to be a member of the Royal British Legion Gulf War Group and I became that because of my long-term campaign because of the damage done to so many people by organophosphates and it was through that route I came to the issue of the Gulf War veterans and the Gulf War syndrome.

I start from the position that I do not know whether there is a connection between organophosphates and the symptoms that have been exhibited by some of the people you met today and many, many other veterans on the other side of the Atlantic. That is not the issue. The issue is that nobody seems to know and 11 years afterwards somebody ought to be really certain. That is the real scandal, real tragedy.

In my statement I refer to the symptoms that are common from acute organophosphate poisoning and I took this from Health & Safety guidelines note MS17 which was not intended to guide those who went to the Gulf. Had it been available to those who went to the Gulf we may have had a different situation. It reveals a huge range of symptoms. This diagram is taken from your own Environmental Protection Agency which illustrates everything from the top, memory loss to muscular loss at the bottom and many of those are similar to those exhibited by Gulf War veterans.

The chronology ran roughly like this on this side of the Atlantic: In early 1994 it became apparent that some organophosphates had been used in the Gulf and as a result of that later in October, 1994 I tabled a parliamentary question:

"How many British troops were exposed to organophosphates pesticides, including malathion, during the Gulf War, and what research his Department has undertaken into the links between the use of these pesticides and Gulf War Syndrome."

The then-Minister was due to reply on 3rd November:

"I am aware of only 10 British service personnel who would have been involved."

And he went on to explain they were simply involved in spraying some 50 Iraqi troops, delousing them. However, despite the fact that that was used, a MoD memorandum produced later demonstrated that in fact that was not the true position. It is all here in my statement I will not go through it all for you but the true position was that many troops were exposed to organophosphate pesticides. Their equipment was sprayed. The basic precautions that should be taken when using these extremely dangerous pesticides which I am sure you know were originally developed in the last World War as a germ warfare agent, that these pesticides were used extensively, warnings were not noted, indeed such was the necessity to increase the supply that they were bought locally when, of course, the instructions were not in the language the operators could understand.

As a result of the admission, the information given to me in the House of Commons was completely inaccurate; the then Minister apologized to the House and to the Select Defence Committee that the mistake had been made. As a result of that the Royal College of Physicians was asked to investigate this particular issue. Again, I quote their conclusions which were basically to say that far greater resources had to be made available in the efforts to discover the causal links behind the suffering of many Gulf War veterans.

Two major concerns were highlighted by the Royal College. First, it did not seem and this has come out from all your witnesses this morning, that the government was taking seriously the concerns of service personnel who went on our behalf, on behalf of the free world to the Gulf. As a result of that lack of interest, not nearly enough resources were being given to this particular issue.

In March this year I asked a parliamentary question again of the Armed Forces Minister that he would give:

"a list of international studies of the effect of exposure to organophosphate pesticides with particular reference to the 1990-1991 Gulf conflict."

I have provided for you his answer to that request. That request I put before the Royal British Legion Group on 21st March and with the help of Professor Malcolm Hooper from whom you are going to have a witness statement this afternoon, we

have been able to identify a huge range of discrepancies in the answer given by the Minister on this very specific issue on the relevance of organophosphates to this particular problem. That is in my supplementary pack for you but no doubt you will wish to talk to Professor Hooper about that. Obviously, his expertise is far greater than mine in these matters.

As a footnote I want to make a quick contribution on the continuing saga referred to already of Shaun Rusling's appeal to the Appeals Tribunal. This morning in Hansard I have got another statement back from the Armed Services Minister, Dr. Lewis Moonie. Again I need not read that into the record but I think it displays a continuing failure to understand the severity of the problems faced by the veterans and perhaps even more serious the MoD seems to be in denial when it comes to the actual use of the words Gulf War Syndrome. Even when the Pensions Tribunal in making its award to Mr. Rusling as you heard this morning, even when there on the official paper it referred to the Gulf War Syndrome, the MoD refuse to acknowledge that there is such a thing and that as a starting point for a really rigorous inquiry seems to me and I am sure many others, to fail dismally when it comes to answering Mrs. Thompson's point which she made at the end of her submission to you this morning: Will the government now be honest about this particular problem?

I have on a number of occasions pressed the government, both through the Leader of the House whom I shadow in the Commons and in terms of questions to the MoD to try and get that degree of clarity into their performances.

Mr. Chairman, I think this issue is not just important in terms of looking back. As Mr. Perot has already said this morning, it is possible that our troops may again be engaged in a similar conflict, perhaps even in that particular war theater in the Middle East. If so, it is critical, it seems to me, that we are better prepared, we know what is involved and we protect those who serve on our behalf in a more effective way.

At the end of my statement I have made a very short submission and perhaps I should read that to you. First, I believe that the MoD and the operational command structure for UK service personnel in the Gulf War were either misinformed or negligent in the way in which they authorized, organized and monitored the purchase and use of organophosphates. Secondly as a result, the MoD failed to acknowledge and investigate the potential role of organophosphates in causing significant illness amounts UK service personnel (especially those directly exposed to risk from OPs). Thirdly, even when the mistakes were discovered and admitted, MoD failed to investigate with sufficient urgency and resource the significance of this connection, or for example, the remarkable coincidence that other allied forces, not exposed to OPs, experienced less symptoms of illness. I think there is evidence that the French are in that category.

Four, the recommendations of the Royal College of Physicians report (commissioned by the Government) have not been followed through in terms of increased emphasis and resources, or even taking advantage of the more extensive and effective US research program. Finally the Shaun Rusling appeal case raises alarming new concerns about the MoD's true commitment to a full and fair investigation of the Gulf War Syndrome; the determination of the US Congress to achieve an exhaustive investigation should prompt the UK government to take a more proactive stance, and to fulfil its obligations to especially deserving British service personnel.

One final point—

Mr. SHAYS. Please do. Can you make it brief?

Mr. TYLER. Lord Morris referred to the fact that originally a question elicited the answer that only one person amongst our troops was affected by the blowing up of the chemical dump, the plume and I established in a recent question that there were at least 9,000 individuals who were affected. That degree of mistake is more than a discrepancy, it is a disgrace.

[The statement of Mr. Tyler follows:]

Gulf War Syndrome and Organophosphates (OPs)

Paul Tyler MP first became involved with the issues surrounding Gulf War Syndrome through his work with the All Party Organophosphate Parliamentary Group, which he established and chairs.

A succinct and official description of the the signs and symptoms of acute OP poisoning include:

- "those related to excessive activity of the autonomic nervous system: miosis (pin-point pupils), blurred vision, lacrimation, excessive salivation, cold sweats, bronchorrhorea, cardia arrhythmias/badycardia with decreased cardia output and hypotension;
- those related to over-reactivity of voluntary muscle: tremors, impaired co-ordination; and
- non-specific symptoms: headache, giddiness, loss of appetite, nausea and diarrhoea

Other signs and symptoms may include:

- Urinary incontinence, abdominal pain, vomiting and bronchoconstriction caused by over activity of smooth muscle
- Glycosuria and hyperglycaemia, leucocytosis, low grade fever; and
- Central nervous system effects:
- Depression of the respiratory centre accompanied by a low arterial oxygen saturation and metabolic acidosis, and in severe cases seizure and convulsions;
- Various non-specific psychometer effects, e.g. apprehension, anxiety, restlessness, irritability, mental confusion, depression, sleep problems such as insomnia and dreaming, hallucinations, expressive language defects, changes of mood, lack of concentration, memory impairment, slowed reaction time."[1]

The symptoms described above were replicated in a number of Armed Service personnel, who served in the Gulf War, and have been referred to as Gulf War Syndrome.

Following the broadcast of an interview on Newsnight with the then Minister Jeremy Hanley MP, in which he invited anyone believing themselves to be suffering as a result of their service in the Gulf War to write to him personally at the Ministry of Defence (MOD), the interest in Gulf war illness had become increasingly widespread.

[1] Quote from Health and Safety Executive Guidance Note MS17

In October 1994 Paul Tyler MP tabled a Parliamentary Question:

"... how many British troops were exposed to organophosphorous pesticides, including malathion, during the Gulf War; and what research his Department has undertaken into the links between the use of these pesticides and Gulf War Syndrome."

Nicholas Soames MP, the then Minister, replied on 3 November:

"I am aware of only 10 British service personnel who would have been involved with organophosphorous pesticides used by the UK forces during the Gulf conflict. These 10 were members of a medical team involved in delousing some 50 Iraqi troops with dusting powder containing 1% malathion at the prisoner of war enclosure at Quaisuma. Malathion is recommended in standard therapeutic textbooks as a treatment of choice for lice infestation and several preparations are commercially available in the UK, including body lotions and shampoo.

No clinical evidence indicative of exposure to OPs has been found among the service personnel who have come forward with concerns about their health related to service in the Gulf. No specific research into organophosphorous has therefore been carried out in relation to the alleged Gulf War Syndrome, though evidence from all relevant sources is closely monitored."

After November 1994, the standard MOD line became that no OP pesticides had been used during Op GRANBY, except when a small number of Iraqi PWs were treated with malathion. In a memorandum submitted to the Departmental Select Committee's investigation in to Gulf War Syndrome, the MOD again stated this as a fact and the line remained unchanged until late 1996.

The MOD produces a memorandum in February 1997 which provides a useful chronology of the events leading up to the eventual apology and admission by Nicholas Soames MP that Organophosphates had been far more widely used than at first reported in 1994. That chronology is reproduced here:

"OP PESTICIDES WERE USED"

June & July 1996

78. From June 1996 onwards, explicit references to the fact that OP pesticides had been purchased locally and were used by British troops during Op GRANBY began to appear in some Departmental documents.

79. Mr John Hutton MP wrote to Minister(AF) on 10 June 1996 concerning a constituent who said that he had used malathion without protective clothing. Mr Soames wrote in reply on 18 July 1996 stating that there was no evidence linking malathion-based preparations with ill-health.

80. On 11 June 1996, Earl Howe answered an oral question from the Countess of Mar concerning the Official Secrets Act and the disclosure of medical information. He answered another oral question from the Countess of Mar on 10 July 1996, this time concerning the funding of certain research into IHGWV&F. On neither occasion was the issue of pesticides raised.

81. A report on the progress towards establishing the epidemiology research proposals announced in January was made on 17 July 1996, in answer to a PQ from Mrs Currie.

Briefing researchers

82. During this period some medical researchers had meetings with MoD HQ staff. This was part of the process of briefing research teams who were intending to offer proposals for research projects into IHGWV&F for consideration by the Medical Research Council (MRC). To assist these teams, three factual briefing notes concerning IHGWV&F were also prepared.

83. One of these notes was titled "Gulf Health Research Programme, Briefing Note for Researchers - No3, Pesticide Use in the Persian Gulf War". It was dated 19 July 1996 and did not carry a security marking. The summary at the end of the note was succinct:

"Pesticides, including a wide range of OP compounds, were extensively used by British personnel during Operation GRANBY."

A Gulf War veteran who had an interest in IHGWV&F issues, Mr Mark Doyle, was sent a fax from MOD HQ on 27 August 1996 consisting of a very short covering letter and a copy of Briefing Note for Researchers - No3.

Telling Ministers

84. On 25 September, in a telephone conversation concerning the subjects on the agenda for a forthcoming meeting, Minister(AF)'s Private Office was told that OP pesticides would need to be discussed. This prompted a request for urgent advice, which was submitted by minute the same day. This advice stated that it had recently been discovered that there had been wider use of OP pesticides during the Gulf War.

85. On 4 October 1996, Mr Soames wrote to Mr Michael Colvin MP, Chairman of the House of Commons Defence Committee (HCDC), to explain that "OP pesticides were used more widely in the Gulf than we had previously been led to believe".[2]

In 1995 The Royal College of Physicians, at the Government's request, carried out an independent audit of the Government's work thus far on Gulf war related illnesses. In his statement of 10 December the Minister welcomed the RCP "endorsement" of the work done by the Government so far. The RCP Report states on page 4 that "US investment in this area is already large and continuing. With the limited resources available in the UK it would seem prudent to take full advantage of the US studies."

In its conclusions it categorically emphasises the need for more funding of this research:

[2] http://www.mod.uk/issues/gulfwar/info/memo_feb97.htm

"The complexities of the issues raised by illness occurring in veterans need further specialist advice, notably requiring immnuological, toxicological and tropical disease expertise The epidemiological issues raise are complex and require very large scale studies for their solutions. Further progress in these areas will require the deployment of far greater resources than have yet been made available."

Two major concerns were thus highlighted: in the first instance if HM Government's commitment to the health of its troops has been genuine ("Whatever the case, we are determined to get to the bottom of it, as I hope very much that this statement has demonstrated.")[3], why were the resources available in the UK so limited, and indeed why do they continue to be so? Secondly, the RCP recommended the deployment of **far greater** resources in the efforts to discover the causal links behind the suffering of many Gulf War veterans. The sums of money that would allow such work to be carried out have not hitherto been forthcoming.

On 28th March 2002, the Minister for the Armed Forces Lewis Moonie MP answered a Parliamentary Question from Paul Tyler with "a list of international studies of the effect of exposure to organophosphate pesticides (OPs) with particular reference to the 1990-1991 Gulf conflict." Dr Lewis Moonie cited 17 international studies. At the Royal British Legion Group meeting of 21st March 2002, Professor Malcolm Hooper agreed to a request from Mr Tyler that an analysis of the inadequacy of this initial reply should be made. This analysis will be submitted to the Congressional Hearing in due course.

Following the decision of the War Pensions Appeal Tribunal to award a pension to Shaun Rusling (a former sergeant in the parachute regiment who served in the Gulf war) it emerged - according to a tribunal report – that the MOD had changed the terms of the submission to avoid any responsibility for Gulf war syndrome. Paul Tyler has raised this matter on two occasions with the Leader of the House of Commons, most recently on 13 June 2002:

"The Leader of the House will be aware that next Tuesday and Wednesday, the US congressional sub-committee on national security, veteran affairs and international relations will hold unprecedented hearings in Parliament on Gulf war veterans and Gulf war syndrome. I ask that we have the Secretary of State's statement on the Rusling case before those hearings take place, given that they are material to it."[4]

[3] Nicholas Soames MP, House of Commons 10 December 1996
[4] Hansard – House of Commons Official Report, col. 1004

Conclusions

It is my submission that:

1 the MOD and the operational command structure for UK service personnel in the Gulf War were either misinformed or negligent in the way in which they authorised, organised and monitored the purchase and use of Organophosphates (OPs);

2 as a result, the MOD failed to acknowledge and investigate the potential role of OPs in causing significant illness amongst UK service personnel (especially those directly exposed to risk from OPs);

3 even when the mistakes were discovered and admitted, MOD failed to investigate with sufficient urgency and resources the significance of this connection, or (for example) the remarkable coincidence that other allied forces, not exposed to OPs, experienced less symptoms of illness;

4 the recommendations of the Royal College of Physicians report (commissioned by the Government) have not been followed through in terms of increased emphasis and resources, or even taking advantage of the more extensive and effective US research programme;

5 the Shaun Rusling appeal case raises alarming new concerns about the MOD's true commitment to a full and fair investigation of the Gulf War Syndrome: the determination of the US Congress to achieve an exhaustive investigation should prompt the UK Government to take a more pro-active stance, and to fulfil its obligations to especially deserving British service personnel.

PAUL TYLER, JUNE 2002

Mr. SHAYS. I would say it is a real issue where the plume went because our numbers were much smaller but go into 50,000. Mr. Sanders?

Mr. SANDERS. Thank you again for your testimony. My Tyler, as I understand it, you came to this issue because of your general concern about the impact organophosphates might have on human health. One of the themes that has also interested me is the fact that many of the illnesses being suffered by the veterans are not new illnesses. They are illnesses that we see in civilian society every day. We have heard what you call Motor Neurons Disease we call ALS, this is not a new illness. It is something in the civilian society. We are also looking at problems like chronic fatigue syndrome. That is what we call it in the US; memory loss or failure to concentrate is a common symptom for a Gulf War veteran, irritable bowel syndrome, depression or mood swings. We heard testimony from people who, if they were exposed to perfume would become quite opposed to it.

My question is: Given the fact that many of these symptoms have been seen for many years and associated with many organophosphates in chemicals, why has that connection not been made more quickly in terms of Gulf War illness? Why has someone not said, "This is nothing new, this is what happens when people are exposed to organophosphates?' Why has there been the reluctance on the part of the government or some of your researchers?

Mr. TYLER. I think your experience must be the same as mine. I think it is quite extraordinary that it took a question from me, a mere layman with no experience apart from my interest, why was it the symptoms were so similar? When I got, "Well, so very few people were exposed so that can't be the connection." It was months and months later that the admission came out of the MoD saying the answer was entirely wrong and thousands of our troops were exposed to organophosphates. So, the only answer I can give is the lack of information in our various departments, after all, the experts here in London were very knowledgeable about the effect of organophosphates and were beginning during this period as a result of campaigners I have been associated with, to be aware of the very considerable dangers of people's exposure, the fact that people went to the Gulf without that information was in fact a scandal without what happened later.

Mr. SANDERS. Where are these experts, these medical people, researches now? How can they evade the issue? I have spoken to hundreds of physicians in one room who treat people who are made ill by exposure to chemicals and then I believe that the AMA medical organization have diagnosed this does not exist. So, this is a very hotly debated issue in the US. Many people do not believe it. My question is, I presume, is there at least a body of thought within the UK whether it is health department people, people in agriculture who understand the potential danger to organophosphates and say, "This is nothing new, we have seen this for dozens of years and of course this is what it is about." Where are those people, where are the voices? Are they working with the veterans organization to pressure the government?

Mr. TYLER. The answer to your question is, yes, yes, yes, yes. Professor Malcolm Hooper is a leading expert and he is coming this afternoon. I think it will be better if he gives you the detailed information you are seeking rather than me as a layman.

Mr. PUTNAM. Mr. Allen, your firm has retained two scientific bodies who are working on the Gulf War symptoms we have referred to today.

Mr. ALLEN. They are not collecting the work. We are analyzing the work. We cannot put the resources you need to conducting your own research and the Americans have spent many, many dollars and I know the MoD have spent over £1m. We are a law firm funded by public funding.

Mr. PUTNAM. That is in a review capacity?

Mr. ALLEN. It is a review of the many articles and papers which are published on the Internet.

Mr. PUTNAM. Mr. Tyler, the focus of your work has been on the role of organophosphates. Do you believe the vaccines and the treatments are not contributing factors to the Gulf War illness?

Mr. TYLER. I don't have the expertise to rule it out. It could be that those who were exposed to organophosphates and had those vaccines, that may well have triggered the sort of symptoms that we have been witnessing. I think that those you will speak to later will give more detailed scientific evidence on that point. I think looking at the most limited point there could well be an interaction as we indeed have found with other people in other walks of life who have been exposed to these pesticides.

Mr. PUTNAM. You referred to French evidence. I am not familiar with that. Can you elaborate on that?

Mr. TYLER. I understand that organophosphates were not used amongst any of the French troops at all and there seems to be a much lower level of reported ill health which would suggest that that may well have been a negative factor, a double negative. That is anectodal, I don't have any direct evidence from the French government or any inquiry in France. It may be Lord Morris can add to that.

Mr. SHAYS. At this time, Lord Morris.

Lord MORRIS. Christopher, I think you were extremely fortunate in having such an impressive panel of witnesses for the bereaved and those who are chronically sick due to the Gulf War and I think we are very fortunate again that we have Patrick Allen, David Laws and Paul Tyler. Perhaps I could first of all ask David Laws, why does he think the government now, you said successive governments have been resisting a full public inquiry. Why does he think that against the mountain of evidence of direct links between the illnesses of Gulf War veterans, they are still resisting? Why is it so important to pursue this matter after the Gulf War ending and what is the MoD's reaction to the decision by the Appeals Tribunal in the Shaun Rusling case?

Mr. LAWS. Well, not only do people who have lost loved ones want to get to the truth but we can sort out compensation, the treatment of those people and make sure servicemen we are sending out now to do the same tasks, to make sure they won't have the same type of health problems in the future.

In the MoD we have three problems. In just talking about the very nature of the MoD, it is used to the culture of secrecy and not seeing very much as being part of the mentality of the health department. There are a few other issues, the issue of compensation but for the MoD to accept direct responsibility, I don't think that is the overwhelming factor. I just used what we are expecting the MoD to do as a department is to take responsibility to get to the bottom of a problem which may have arisen as a consequence of failures whether understandable or not; failure of the people accountable in 1990 and 1991 and no one likes to mount a great searching investigation into issues likely to reflect badly on themselves.

Lord MORRIS. My approach was to go to the Prime Minister on the grounds that more than one department is involved and that the case, the centrally important point in the case was that a departmental inquiry is not good enough. So, that is why I approached and Patrick knows all about this, the Prime Minister to say that only the Prime Minister could arrange a wide-ranging inquiry with all the departments across Whitehall.

Mr. LAWS. I think you are right and it may take momentum from someone outside the Prime Minister looking at the issues to get an independent inquiry. When the government came in in 1997 it did not have the historical baggage so it started off more interested in getting into office; however, Ministers come and go but our servicemen remain the same. So, the culture is not to get to the bottom of the situation so I think you are right, it may take the Prime Minister to force the MoD to think again.

Lord MORRIS. Patrick, you are a highly respected lawyer in this field who said that you support a public inquiry. I think it might help our American colleagues if you could tell them about the kind of issues, tragedies that have been looked into by public inquiries like Paddington, Alderhay, the sinking of the Marchioness and the scale of those tragedies compared to this one.

Mr. ALLEN. Sadly, we have had quite a number of national tragedies, mainly concerned with transportation disasters and generally speaking there has been a public inquiry. Sometimes, the government has tried to save money by not having one. That is not the case with the Marchioness where a pleasure boat sank in the river and the public inquiry only took place ten years later. They want to save money but getting to the truth can be quite expensive. You have to really assemble in public all the relevant evidence with witnesses and then those concerned, the injured and bereaved, can see issues are being got at responsibly and can be satisfied there is no stone unturned.

With the Gulf War it is the opposite. There is suspicion that things are covered up and delays and the MoD have a lot of the facts. They control a great deal of the information. Most of us do not have the information. They have information about which vaccines were used; some medical records were destroyed inadvertently, we understand, but only by having a public inquiry can the injured, the bereaved get their hands on the information. In the past we have got to the truth, sadly a lot of the recommendations have not been implemented but at least the public links have taken place and that is what we need with Gulf War illness.

Lord MORRIS. You point out that 100 percent for disability pension is not a king's ransom. I know Ross Perot's favorite quotation from Kipling is as follows: "Look where he's been, look what he's seen, look at his pension and God save the Queen."

But, I am very glad that you point out we are not talking here of creating millionaires.

Can I just turn to Paul. Paul, I think it was John Major, a constituent of John Major's who said he was spraying in the tents and, of course a great many people who were not mentioned in answer to you were very closely involved in that they were spending all day every day spraying the tents where our soldiers lived, with organophosphates and it was reported that some of them were soaked to the skin with organophosphates. How can it possibly be thought by anybody that that would not have very serious consequences against the background of our experience in the farming industry in this country?

Mr. TYLER. That is absolutely right and it was indeed not only that that was revealed much later which meant, of course, there was a delay in anybody taking very effective remedial action, but it became apparent as I did mention, that some of the organophosphates that were used were purchased locally, presumably in a bazaar, who knows where, with Arabic instructions on them so there was no possibility of those using them understanding the very considerable dangers, the precautions they should have used nor provided the basic advice then available here in London in other departments for those manufacturing organophosphates and for those using them in other wars.

Lord Morris, you are absolutely right some of the people were absolutely saturated. Then of course the question was raised and the MoD has tried to use this as a way of trying to explain why they did not follow this. In those circumstances why didn't all those people concerned go down with a very serious illness and it may be members of your team have seen this illness. It would appear some people are more genetically vulnerable to organophosphates than others and this has been proved in the agricultural field alike. It shows again the lack of medical follow-up.

Mr. SHAYS. Let me just say that is a wonderful statement that after lunch we can introduce those in the medical community and academic community who will speak to the issue. Mr. Perot you have the floor for ten minutes.

Mr. PEROT. I would like to thank you for your honesty, integrity and courage for taking these issues to parliament for the armed services. I know how much that meant to them and God bless you for what you are doing. All the studies on the organophosphates I can truly say from World War II where the question was did you have flat feet, if we get all the things going you are trying to get done, genetic makeup, our vulnerability to many of the chemical and biological weapons out there, I would like to ask you, our government is now being very aggressive, looking at all these issues. Our real challenge is to get the British government take the same aggressive attitude. Let's find out what the problem is, so on and so forth. What is the realistic way to get the British government to react? We had the same problem. We had all these people in place saying "this is not right" so on and so forth and now we are really starting to move. It's late but better late than never. But, in terms of protecting our troops and population in the future it is important to get it done. What would be your advice for the best way of getting it done?

Mr. TYLER. Rather than giving you advice we are taking your advice because you are one step ahead of us. There are three elements critical to us. We as representatives don't give up and don't intend to give up as you have not else you would not have been here. Second, media interest. I don't know to what extent it has happened in the States but here on television, radio and written media there is a continuing concern to the way we treat our veterans and I pay tribute to the way the Daily Express has taken up the case and done a grand job. The third thing is we learn from one another. It is absurd people who stood shoulder to shoulder in the Gulf can't stand shoulder to shoulder about the work being done with their veterans.

Mr. SHAYS. If I can just interrupt, that key point is why we are here. We are shoulder to shoulder, we are trying to learn from you and you can do some learning from us.

Mr. PEROT. Anything that we can do that would be helpful we are right there. Again, my question has already been asked but I want to thank you because I understand this is a lonely mission but the military troops are on long lonely missions all the time with their lives at risk and it takes time and energy to stay on top of it. Thank you so much.

Mr. SHAYS. Thank you, Mr. Perot. I won't take my full ten minutes but just respond, Mr. Tyler, to your point about organophosphates. We also want to respond to you, Mr. Laws. You were almost having to explain why you were here because of a constituent and I think that is important to continue to emphasize we are laymen in our field. We are members of Congress, members of Parliament but it tends to be onerous. It is like going to a large university, getting a passing grade but then we specialize in a few areas and we respond to our constituency. All of your constituents would want you to respond to the few and in the case of my work in Con-

necticut I have already mentioned one gentleman, an air force pilot who served in the Gulf War. There was another one who was told his job was to spray the Iraqi prisoners and he did it in a large tent with no ventilation with no air conditioning and he spent eight hours a day, give or take, day in and day out spraying prisoners, tens of thousands of prisoners with lindane which is an organophosphate. Shortly after he contracted pancreatic cancer and died and there was incredible effort on the part of the government to say no connection.

We went out and came back with this answer, but what amazes me is we focussed on the workplace. We would never have allowed lindane to be used in that way without preventive gear, ventilation, so on. Probably what we have learned as well, you all in Great Britain have this same practice as we have in the US and that is we can order our troops to do something that would be against the law to do.

Finally I want to say there will be more wars and it is incredibly sad we have not learnt from previous wars. I also had a constituent who had lung cancer. He had sprayed British airplanes involved in nuclear tests in the US. Listen to this answer. He was denied benefits because he was not cleaning an American plane so the view was it was not a US airplane. We had to come back and say "But he was under US command to clean and wash down that airplane."

So, I don't have questions because you all have done a wonderful job. I would just finally conclude by saying is there anything we should have asked you that we should make part of the record, anything you feel needs to be put in the envelope?

Mr. ALLEN. I think the government should set up a Gulf War compensation scheme; they should set up a proper treatment program similar to America and there should be a public inquiry into Gulf War Syndrome.

Mr. LAWS. I would like to say finally in response to Ross Perot's question, what will get a public inquiry. It is clearly going to require an independent external force on the government rather than a response to the veterans who for many years have been fighting this case. That is why it is so important that the Shaun Rusling case got such a high profile, but you came to the country and that gave a terrific boost to put it back on the agenda.

Mr. TYLER. I think your words about the necessity to take advantage of some of the specialists I hope will be partially fulfilled this afternoon. Not only have we got Malcolm Hooper but also Dr. Goran Jamal who has already given evidence to you and I have worked with him on the neurological effects of organophosphates and I am sure you will find that extremely helpful.

Lord MORRIS. Can I say how sad the Countess of Mar was not to be able to come. I am sure Margaret, had she been here, would have been very proud of our witnesses.

Mr. SHAYS. I can say for the record we met with her in the US and we met with her here. She was a very compelling person who argued that both the US and Great Britain do more to deal with this issue.

We are going to be on recess for three-quarters of an hour. We will begin fifteen minutes earlier and I would encourage the staff to see all the witnesses are here. I believe all our witnesses are invited to lunch. Do get some lunch and then we will reconvene in 45 minutes. I thank you Mr. Laws, Mr. Allen and Mr. Tyler. Thank you very much.

Mr. SHAYS. I would like to call our inquiry to order and welcome our panelists and guests. Note for the record that we do like the sun, specially in London, but we are probably going to want to see the screen a little better and when we are looking at the screen the members will sit on the chairs over there.

I will announce our witnesses for this panel this afternoon in the order that they will speak. Professor Malcolm Hooper, President of the National Gulf Veterans and Families Association. Second speaker, Professor Graham Rook on vaccine hypotheses relating to multiple immunization programs. The third speaker will be Goran Jamal on neurology relating to Gulf War veterans. The fourth speaker will be Dr. Mike Mackness on paraoxonase and finally number five will be Chris Busby on the effects of depleted uranium. We have the five very respected panel members and we are delighted that you are here and we will start with you, Professor Hooper.

STATEMENT OF MALCOLM HOOPER, PRESIDENT, NATIONAL GULF VETERANS AND FAMILIES ASSOCIATION; GRAHAM ROOK; GORAN JAMAL; AND MIKE MACKNESS

STATEMENT OF MALCOLM HOOPER

Professor HOOPER. Thank you very much, sir. I think it is time for you to move now.

Mr. SHAYS. I feel very nervous not having a microphone. Perhaps I'll take the gavel. You aren't going to get too technical on us, are you?

Professor HOOPER. I hope not.

First of all, thank you very much, Chairman, Lord Morris and all the other members of the Panel for inviting us to speak.

[Slide presentation.]

Professor HOOPER. This is who I am and the point I want to make here is what we are seeing is the most toxic war in Western military history was fought in the Gulf War. The bottom line for me and I think many people is truth, justice and our shared humanity in common relationship with the land on which we all have to live. It involved soldiers, people, military and government and the debt of honor which is recognized by the Select Committee 2000.

There are syndromes of uncertain origins described in the Merck Manual 1999, 17th edition. It is known as Gulf War Syndrome and also known as the ME of the military. All this group of syndromes includes ME, chronic fatigue syndrome and others, chemical sensitivity all of which have been diagnosed on Gulf War veterans. In addition we heard earlier this morning about organophosphates. All these clusters of syndromes give rise to a large number of disorders of the various systems in the body: neurological-ans, pns, cns, cardiovascular immune system, gastrointestinal, respiratory, endocrine system. Anything left? They are all disturbed in one way or another, but the comment that you see very often is that patients complain of disabilities; despite the wider range of disabilities the routine laboratory tests are strikingly normal. That is the reason for doing a number of routine tests in my book.

But, one explanation is that this is all in the mind; it is in the mind. That is one explanation. This is another explanation we have been working with where all these overlapping syndromes have dysfunctional states which cover many systems. The brain immune system, the gut, the endocrine system. So we have tryptophan, sulphate and lipid metabolism as being part of that story. We have heard about that today.

I want to quickly go through this. Too many vaccines given simultaneously. The MoD admits to 10 but you heard this morning that it went to 14—

Mr. SHAYS. Can you talk a little slower and we are going to ask you to look at the transcript and see the words are put in a way that would be helpful.

Professor HOOPER. Okay, 10 vaccines were admitted by the MoD but you heard this morning some people had 14. One Gulf veteran whose record we managed to reconstruct, had 18 in one day. Another had 14 in two days in the Gulf. USA troops in fact had 17 vaccines they received. They were given too close together, in wrong combinations, live vaccine, cholera and yellow fever negate their response. In defiance of established protocols which are well written up in medical reference text books and three UK studies have found 2-3 fold excess of symptoms among Gulf War veterans and an association of symptoms with vaccines.

The evidence against vaccines now is overwhelming in my judgment. The study by Kings College is the first DOD report, then Cherry and other colleagues at Manchester funded by MRC/MoD. MRC approved the study and I think one of the most important studies was done by Steele in the Kansas State study. I think this is a very definitive slide because what it shows is if soldiers were not given the vaccine only 3.7 percent came up with symptoms like the Gulf War Syndrome. People who were vaccinated but did not go to the Gulf, 11.5 percent of these people showed Gulf War Syndrome. People who were vaccinated and went to the Gulf showed 34.2 percent. This is clear evidence that the vaccine played a clear role. The Rook-Zumla hypothesis was in 1997, not 1999. Graham Rook is here to provide a deeper understanding of what that means but he recognized that the vaccine could provide some information.

The government independent panel has this title, it is not my summary, it is its full title. All it does show is animal studies. It has not looked at human beings at all. Guinea pigs, mice and marmosets. The mice study will not be finished till later this year; marmosets in 2003 and this is 12 years on and then it is only with marmosets. The panel has been excluded from conducting or recommending any studies of sick Gulf War veterans. This has been challenged three times in its meetings and three times the answer has been no.

Another important point is the cholinergic triple whammy which includes pryadostigmine bromide which you heard so much about, organophosphates, carbonates and sarin tabun vx agents and possibly mustard gas. The inhibition of AchE leads to increased levels of acetylcholine in all four systems and the consequence is synergism. There is synergism between the two compounds causing multiplication of something like 10 x 200 fold. Paraoxonase is being looked at by Mike Mackness and Goran Jamal who present on the new role solely of the consequences.

Pyridostigmine bromide. PB cannot be ruled out as a possible contributor to the development of unexplained or undiagnosed illness in some Gulf War veterans. I raised this in a paper to the Select Committee in 1999. The use of PB may reduce somewhat the effectiveness of post-exposure treatment for non-soman nerve agents. So you are into an issue of trading off uncertain health risks against uncertain gains which is not helpful.

Pesticides or organophosphates. These were extremely widely used. It was denied then there was an apology. Diazinon, malathion, some unknown from local sources. No proper protection for the operatives or the troops. 1 HSE trained operative diagnosed by MAO as organophosphates poisoned. It is highly contentious and political because these were used by agriculture, fish and other civilian usage. Pyrethroids and lindane were also widely used and deet also very widely used in large quantities. In addition, synergy has been demonstrated, see Abou Donia et al in the States and you are familiar with that work.

Chemical warfare nerve and mustard agents. Sarin, Tabun, VX, no soman. Work in the States suggests there was no soman so we need not have used PB at all. What was the source? Opening air war, demolition of Khamisiyah and possibly some scuds. Frequent alarms, all false, disabled, ignored and there was persistent low level exposure not at a killing level. Eye witnesses repeatedly confirm the presence of nerve and mustard agents and we have had news from the Czech teams about this. They have dismissed equipment as faulty not credible now recognized as reliable. Does low level exposure give rise to chronic damage? Yes from 1970 onwards.

This is the DU story and Chris Busby is going to talk about this. This is a depleted uranium penetrator. A depleted uranium shell equal to a dirty bomb using nuclear waste; 350 tons at least were fired in the Gulf War and the hazard has been known and understood since the 1970s. Health risks are impossible to quantify according to a 1994 report and remedial action was required—

Mr. SHAYS. Let me interrupt you. I am not asking you to shorten this but how much more time do you need?

Professor HOOPER. Just one more.

Mr. SHAYS. Please proceed.

Professor HOOPER. There were no orders to the troops about this, no advice, the troops were knowingly exposed because people knew the material was being used. This resulted in thousands of unnecessary exposures. The response by the government was last year and the depleted uranium oversight was discovered in 2001. So, nothing was done for twelve months.

This is an American veteran, he came back with his child, you can see the damage to the child. This is an Iraqi child, the photograph taken in Iraq, taken by Professor Guenther and you can see the damage to the structure of the limbs.

The Medical Assessment Panel has seen some 3000 Gulf War veterans. Papers and letters have been written by the various teams since 1996. The latest paper is extraordinary in claiming that of the last 1000 veterans seen by the panel 80 percent were well but well with symptoms or organic disease which is not my definition of well. They have turned to somatization, war syndromes and explained Gulf War Syndrome and this was roundly rebuffed by your Committee as I understand it—

Mr. SHAYS. Our Committee?

Professor HOOPER. In Washington. The letter was contemptuously rejected which said war syndromes were the cause of the problem. We have also got now three categories of the disease, not contentious: Motor Neurons Disease-2-3 times; cancer of kidneys found in large excess and chronic lymphocytic leukaemia ten times.

Mr. SANDERS. That is ten times more for Gulf War veterans than civilians?

Professor HOOPER. Yes, from the three determined in the medical profession. There appear to be no records of these or any other diseases kept in the central program so we often don't know what is going on. This is a quote from a letter from a medical assessment panel:

"Very substantial progress has been made on Gulf War related illnesses...the most telling feature being that they are primarily psychological dysfunctions...recorded since at least the American Civil War. Not unique to Gulf conflict. No illnesses specific to participation in Operation Grancy. He has a psychiatric illness. I hope he will not waste his time, energy, aspirations chasing after non-existent organic explanation that will never be found."

That is the official line. Conclusions. It is not a result of somatization or a manifestation of a general war syndrome. It is not primarily a result of PLSD. It has multiple causes not a single cause. It is an organic illness affecting multiple systems resulting from the unique multiple exposures suffered by Gulf War veterans.

[The statement of Professor Hooper follows:]

STATEMENT OF PROFESSOR MALCOLM HOOPER CHIEF SCIENTIFIC ADVISOR TO THE GULF WAR VETERANS IN THE UNITED KINGDOM BEFORE THE SUBCOMMITTEE ON NATIONAL SECURITY, VETERANS AFFAIRS, AND INTERNATIONAL RELATIONS

Chairman Congressman Christopher Shays
Attlee Suite, Portcullis House, Bridge Street, London
June 18th 2002.

I am most grateful for the invitation to present evidence to the Subcommittee in support of the UK Gulf War Veterans, GWVs. I have been intensively involved with all the GWVs since 1997 when they invited me to act as their Chief Scientific Adviser. Since that time I have

- Served on two Government Committees
- The Independent Panel for the Assessment of Government Research on the possible Interactions between Vaccines and NAPS tablets (Pyridostigmine Bromide), established 1997.
- The Depleted Uranium Oversight Board, DUOB, established 2001.
- Evaluated and assessed the published papers from various research groups in both the UK and USA.
- Supported, liased with, and advised research groups carrying out independent research on behalf of Gulf War Veterans at Manchester, in the USA and Canada, and Germany
- Written papers and delivered lectures on Gulf War Syndrome/Illness to a variety of professional groups including qualified Medical Practitioners who are Consultants and General Practitioners.
- The written papers included a major submission to the House of Commons Select Committee on Defence in December 1999, Hooper 2000a.
- Corresponded with Medical Practitioners on behalf of GWVs and offered advice on diagnosis and treatment, particularly, in the light of the IAG test carried out in the Autism Research Unit, ARU, at Sunderland
- Supported GWVs by writing reports and examining medical documents for various Hearings and Appeals connected with their claims for pensions and compensation for their chronic illnesses.
- Carried out a pilot research programme, in conjunction with the ARU, that has sought to identify common underlying biochemical deficits in related syndromes, including ME (Myalgic Encephalomyelitis also called CFIDS (Chronic Fatigue Immundysregulation Syndrome, or Chronic Fatigue syndrome, CFS, Fibromyalgia, Multiple Chemical Sensitivity), Hooper 2000b.

I am the Emeritus Professor of Medicinal Chemistry at the University of Sunderland with a lifetime involvement in research and undergraduate and postgraduate teaching programmes. I have published in major scientific journals and served on National and International Committees/Organisations concerned with drug design, action, and development.

I have compiled the following notes that should be read in conjunction with the attached copy of Powerpoint slides.
I have also attached copies of documents written in response to major papers published on Gulf War Syndrome/Illness

1. The Gulf War- Slide 1

This war was beyond doubt the most toxic war in Western Military history and resulted in the exposure of USA and UK troops to a wide variety of biological and chemical toxins. I judge the major toxins to be

- Vaccines which included biological warfare vaccines.
- Pyridostigmine bromide (NAPS) tablets
- Pesticides of various categories
- Chemical Warfare Agents – nerve agents and mustard compounds.
- Depleted uranium dust particles that could be inhaled.
- Oil and Smoke from the fires

The Institute of Medicine Report, IoM 2000, identifies other exposures and give a total of 33 toxins. Of these fuels, CARC paints, and fumes are likely to be significant.

2. Symptoms of Gulf War Syndrome and Other Syndromes

This table shows that a variety of modern chronic disorders and diseases share a wide range of common symptoms that indicate multi-organ and multi-system disturbances. The hope was expressed during the first stage of the Hearing in Washington, Jan 2002, that understanding GWS/I would provide new insights into the diagnosis and treatment of these other syndromes. I share this hope which our own preliminary studies support.

3. Syndromes of Uncertain Origin

These are variously called SSIDC (signs and symptoms of ill-defined conditions), the War Pensions Agency or MUPS (multiple unexplained physical signs), Medical Assessment Panel, MAP.

The medical reference literature includes GWS among these syndromes and the slide shows how these syndromes are related. It is significant that chemical poisoning by organophosphate pesticides, OPs, produce similar symptoms. The same is true of organochlorine pesticides such as lindane, Richardson 2001.

It is clear that these syndromes share a common pattern of organic damage to the nervous systems, cardiovascular system, immune system etc- see slide but that the results of routine medical tests are often surprisingly normal. This points to the need for non-routine tests rather than the alternative explanation of somatisation, espoused by some physicians in the MAP and elsewhere, Lee et al 2001. Others both in the UK , Jones et al, 2002, and USA, Hyams et al, 1996, have tried to suggest that all wars produce similar casualties associated with a War Syndrome and that the Gulf War is in no way unique. This view was contemptuously rejected during the earlier part of the Hearing, Washington, 2002.

4. Organs and Systems affected by Toxic Exposures

This table shows the known effects of the major toxins on various organs and systems in the body and indicates a massive assault on any one exposed to these toxins.

5. The Steele Study- TIME

A very important epidemiological study by Lea Steele of a large cohort of Kansas GWVs, Steele 2000, shows that the percentage of the troops with GWS/I varies with time spent in theater. This slide shows that up to 41% of the troops who stayed until July 1991 developed GWS/I strongly supporting the concept that the longer the time in the toxic battlefield/theater the greater the exposure and the greater the prevalence of GWS/I. Shorter times in theater lead to a lower prevalence of GWS/I.

6. The Steele Study – LOCATION

This slide shows a remarkable variation in the prevalence of GWS/I depending on the whether or not troops entered the major battlefield area of Kuwait and Iraq. The high prevalence of 42% with GWS/I again reinforces the understanding that it is presence in the most toxic battlefield areas that leads to the greater prevalence of illness.

7. The Steele Study – VACCINES

This slide shows the effects of vaccination on the prevalence of GWS/I. The prevalence on GWS/I among troops receiving the vaccines and deployed to the Gulf was 34%. Very significantly, troops that received the full complement of vaccines but were not deployed show a much higher prevalence of GWS/I (12%) than matched era troops (3%) who did not receive the full set of vaccines. This clearly indicates that vaccines are contributors to GWS/I and represent a major toxic insult.

Although the vaccine regimens in the USA and UK were different vaccines were the most strongly associated factor in two UK studies, Unwin et al, 1999; Cherry et al, 2001. Neither of these analyses included time or location.

8. The Vaccine Regimens

UK troops are generally said to have received 10 vaccines including the Health and Hygiene vaccines, however, it is clear that some vaccines were not fully disclosed and that from eyewitness accounts more that these were given. There is also some evidence that some UK troops received USA vaccines in theatre.

Informed consent was not obtained. In the case of pertussis (whooping cough), given as an adjuvant with the anthrax vaccine, this was an experimental combination that was used although a fax received by the MOD had advised that in mice this combination had shown disturbing and damaging effects resulting in deconditioning and loss of weight. Pertussis is not normally given to adults and when it is a much reduced dose is used, British National Formulary, 1999.

In contrast USA personnel received up to 17 different vaccinations. The use of squalene as an adjuvant in some USA and, possibly, UK vaccines is a matter of concern that requires further investigation. Squalene antibodies, Asa et al, 2000, have been found in some UK veterans. The USA anthrax vaccine was poorly quality controlled and has been much criticised.

9. Vaccine Problems Summary 1.

This shows that vaccines are strongly associated, in two UK studies, with the 2-3 fold excess of symptoms found among UK (and USA) personnel who served in the Gulf.

The Hotopf et al paper was particularly strongly criticised, BMJ eLetters, 2001, and had to withdraw its major claim that only vaccines given in theatre were associated with GWS/I. No analysis comparable to that of Steele was performed.

10. Vaccine problems Summary 2.

The absence of records has bedevilled the attempts to identify the possible links between vaccines and GWS/I.

Vital details about vaccine-induced illnesses immediately following vaccination do not appear to have been collected or analysed. Lack of such information could seriously mislead investigators and reduce the apparent impact of vaccines on the health of the troops.

The fact that only 2 vaccines given simultaneously was strongly associated with the Centres for Diseases Control, CDC, multi-symptom syndrome again indicates the very significant adverse effects of vaccines on health.

A key conclusion from the papers by Cherry et al, 2001, is that the GWVs were credible accurate witnesses.

In 1999, following the Unwin paper the Rook-Zumla paper was published drawing attention to the possible adverse immunological effects that might ensue from the vaccine regimen experienced by the majority of UK personnel.

11. Reconstructed Records of a GWV.
This record compiled following consultations with the MOD shows that 8 vaccines were given on a single day and also illustrates how missing and incorrect records contribute to making the discovery of the truth difficult.

12. Independent Panel
This Panel was established to oversee only Government Research Programmes concerned with animal experiments that have doubtful relevance to the situation of the GWVs.
The Panel has steadfastly refused to consider any programme that involves examining sick GWVs.
I previously described the Panel as being used as an alibi for the Government to claim that it was taking action when the action does not directly address the needs of GWVs. Although the members of the Panel are clearly experts in their fields I continue to see the political use of the Panel as an unacceptable way of avoiding engagement with the real problems of the GWVs.

13. Professor Graham Rook
Professor Rook is an acknowledged expert on vaccines and vaccine-related issues.

14. The Cholinergic Triple Whammy
Three of the common exposures cause inhibition of the enzyme acetylcholinesterase, AchE. This enzyme plays a key role in regulating the levels of acetylcholine, a neurotransmitter, in the central, peripheral, enteric, and autonomic nervous systems. Inhibition is reversible in the case of pyridostigmine bromide (NAPS tablets) and carbamate pesticides but irreversible and therefore longer term in the case of OP insecticides and chemical warfare nerve agents. Among the nerve agents soman is of particular concern as the enzyme cannot be rescued by the use of the antidotes provided at the time Gulf War. The reason pyridostigmine was used to protect the troops was to counteract the effects of soman. However, in the event it now seems that soman was not detected in the Gulf making the use of pyridostigmine unnecessary. Sarin, tabun and VX are all mentioned in various contexts, Reigle, Shays , Burton.
Inhibition of AchE leads to increased levels of acetylcholine in all four systems. The consequences are both acute and immediate and also chronic and long-term. The latter are contentious.
The acute effects are thoroughly described in pharmacology textbooks and include, excess sweating, respiratory and cardiovascular effects, loss of bladder and bowel control, eye problems, etc. Hooper, 2000a.
The chronic effects include all the symptoms in Slide 2.
Neurotoxic Esterase, NTE, is another key enzyme inhibited by all these compounds and affects nerve function. NTE is also found on some cells of the immune system.
Other enzymes and proteins also bind these compounds. Rather worrying is the binding to brain proteins that are much more sensitive than AchE and NTE.

15. Pesticides
The use of OPs in the Gulf was originally denied by the Minister, Nicholas Soames, and the extent of use did not emerge for some time. Subsequently he apologised to Parliament for this

misleading of the House. It is clear that large amounts of OPs were used, these included diazinon, as sheep dip!, malathion, and some unknown OPs purchased locally. The nature and concentration of the locally obtained material was not known with any degree of certainty and contributed to the misuse of these materials. Chlorpyrifos was widely used in the Gulf by USA forces.
A major factor in the toxic exposure to OPs was the lack of any adequate protective clothing for trained operatives who were regularly and frequently exposed to OPs.
There is a widespread national debate about the long-term toxic effects of OPs on people working in agriculture and fish farming. The subject is highly political and there are many vested interests.
Pesticide exposure has been identified as a significant factor in a study of UK troops, Cherry et al, 2001.
Other pesticides include pyrethroids which are synthetic compounds derived from the a natural product. They are generally regarded as led toxic than OPs and act in a different manner. They inhibit nerve function and are known to have significant side effects.
DEET is an insect repellent that is widely used and was supplied at high concentration to the troops. It is also regarded as a safe compound but is known to have significant side effects.
Very disturbing is the demonstration of synergism between these compounds that results in greatly increased toxicity, Abou Donia 1996 and related papers.
Lindane is an organochlorine pesticide. This group of pesticides are known to be toxic and persistent, biological half-life ~50 years. They are generally no longer used but have become so widespread that all of us are contaminated with this class of compounds which includes DDT. The symptoms of organochlorine poisoning are indistinguishable from ME, Richardson 2001.

16. NAPS tablet- Pyridostigmine Bromide
This slide summarises the conclusions of the Rand Report on Pyridostigmine Bromide. The Rand Reports were commissioned by Bernard Rostker, a former head of the Rand Corporation before he became Chief Adviser to the Clinton Government. This raises questions about their independence.
The Golomb report I regard as a good report that covers an enormous literature but its conclusions are rather timid. Nevertheless, it still makes clear that pyridostigmine bromide, PB, is a very questionable drug for use by the military and could have contributed significantly to GWS/I. See also Hooper, 2000a.
The work of Bob Haley clearly implicates PB as a major factor in syndrome analysis and identification, Haley 1997, etc.
The UK study by Cherry et al, 2001, also points to a possible association with PB.

17. Nerve and Mustard Agents
The release of these agents has been the basis of repeated denials and obfuscations by the MOD in the UK and the DOD in the USA.
It is now increasingly recognised that these agents were released as a result of bombing of selected targets by Coalition Forces just prior to the ground war and demolition of storage bunkers immediately after the end of the 100 hour ground war.
The extent and frequency of the alarms detecting these agents was such that they were disabled or switched off. They were certainly largely ignored.
The alarm producers and the expert, Czech, chemical detection team have been repeatedly demeaned by public comments about the unreliability of this equipment and the detection procedures. Finally it was acknowledged that the alarms were reliable and effective.

Nevertheless the MOD continues to insist that there is no evidence of any exposures to these agents.
Iraqi Scud missiles probably released some nerve agent but in the main these were few and far between. Mainly the releases appear to have come from Coalition activities.
In an interview with Bernard Rostker, September 2000, he made it clear that the USA advisers had not considered the possibility of low level exposures, at sub-clinical levels, to these agents. If they were released people would die unless they were fully protected. The USA took out 150,000 body bags in expectation of very high casualties.
Chronic damage has been demonstrated in animals since 1970. Many experiments with nerve agents were carried out at Porton Down so there must be some UK data on the chronic effects of these agents if the participants in these studies were followed up.

18. Dr Mike Mackness and Dr Goran Jamal
Dr Mackness is a world expert on paraoxonase an important enzyme that detoxifies OPs. He will present the results of his study on GWVs.
Dr Goran Jamal is a Consultant neurologist who has studied extensively the neurological damage associated with OPs and found in GWVs. He was an expert witness to the first part of the Hearing held in Washington, January 2002.

19. The DU Story
Depleted uranium, DU, munitions were officially used for the first time in warfare in the Gulf War. The hazard arising from ingestion but particularly inhalation of small particles of uranium oxide have been recognised since at least the 1970s in military manuals.
The need for protection, monitoring, and treatment is acknowledged but none of this information was given to the troops although a fax advising of the problems associated with DU did go to Iraq before the ground war started.
The failure to properly disseminate this information to the troops has resulted in unnecessary exposures.

20. DU and Birth Defects
This slide shows birth defects found in a child born to a USA veteran and a child from Iraq. They share the same defects which involve deformation of the limbs, hands and feet. They are illustrative of the consequences of genetic damage in fathers who have been exposed to Gulf War toxins. DU is a major genotoxin and such damage is consistent with exposure to and contamination by DU.

21. DU Exposures
DU, an alpha-emitting radionuclide, can be unambiguously identified by its nuclear signature. Studies, in Canada, commissioned by the GWVs have found significant levels of DU in their urine 8 years after the Gulf War. GWVs are suffering from significant internal radiation by insoluble DU compounds which has accumulated over many years.
A pilot study from Germany has found extensive chromosomal aberrations in the lymphocytes of GWVs.
Both these observations are consistent with the known properties of DU and the mechanics of DU dust formation and release in the Gulf.
DU is undoubtedly a major factor in GWS/I.
Official responses in both the USA and UK have been to neglect any studies on DU and to deny any possibility of significant damage associated with contamination by DU during the Gulf War. And to rely only on old science to understand the new situation arising from the Gulf War.

Only now, 11 years after the Gulf War, and after considerable pressure from the GWVs has a Government Board been established to look into these questions.
Dr Chris Busby is an international expert on low level radiation who will provide compelling evidence of the mechanism and consequences of biological damage from internal contamination by radioisotopes that persist in the body.

22. Medical Assessment Panel

The activities of the Panel continue to cause dismay amongst GWVs many of whom have withdrawn their support from the Panel and I am unable to recommend that any GWVs should attend the Panel in view of the recent paper, Lee et al, 2000. This espouses somatisation and war syndromes as an explanation of the excess symptoms found among GWVs. The agenda of the Panel appears to be a principal concern with rejecting any suggestion of a GWS/I whatever evidence is published in the literature.
The Panel has described itself as not a research Panel but one which simply investigates the GWVs referred to it.
It does not offer any treatment and appears not to keep any national data base of reported illnesses amongst GWVs.
It contributes to obfuscation and confusion rather than supports GWVs.

23. Conclusions

From published work it is now an inescapable conclusion that there is a Gulf War Syndrome and that it is characterised by major organic damage to the many GWVs, Haley 2001 and other papers.
Explanations based on War Syndromes and somatisation are specious and an insult to the GWVs.
Further studies are necessary but there is sufficient information available for much greater care of the GWVs to be offered now.
By knowing the full extent of damage caused to GWVs during the Gulf War it will be possible to plan to avoid similar illnesses amongst the troops of the future.
The debt of honour owed to the GWVs requires research and action now together with a proper compensation for all who are ill and their families.

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> I WOULD EMPHASISE THAT THESE FINDINGS ARE PRELIMINARY, BUT THEY DO SUGGEST THAT IF USED IN MAN AS A COMBINED PREPARATION, AN ENHANCED DEGREE OF REACTOGENICITY COULD OCCUR. THE USERS OF THESE VACCINES MAY WISH TO TAKE THESE FINDINGS IN (SIC) CONSIDERATION."

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Roland PS, Haley RW, Yellin W, Owens K, Shoup A.. Vestibular Dysfunction in Gulf War Syndrome *Otolarynol Head and Neck Surgery* 2000, **122**, 319-330.

Rook, G. and Zumla, A. Gulf War Syndrome: is it due to a systemic shift in cytokine balance towards a Th2 Profile? *Lancet* 1997, **349**,1831-33.

> The DoH fax which was received, 21st December 1990, but not acted on states, "As you will know, we have recently carried out abnormal toxicity testing in laboratory animals on certain batches of *B. anthracis* and pertussis vaccine. When the two vaccines were tested alone they were not associated with an unusual degree of toxicity at a single human dose level. However, when combined there was evidence of **severe loss of condition and weight loss in animals.** (Emphasis added)

Unwin, C., Blatchley, N., Coker, W., Ferry, S., Hotopf, M., Hull, L., Ismail, K., Palmer, I., David, A., Wessley, S. Health of UK servicemen who served in the Persian Gulf War. *Lancet,* 1999, **353**, 169-178.

Wessley S, Nimnuah C, Sharpe M. Functional Somatic Syndrome: One or Many. *Lancet* 1999,**354**,936-9.

SYMPTOMS	OPs	GWS	MCS	FMS	CFIDS	MS	AID
JOINT PAIN	+	+	+	around joint area	+	+	+
FATIGUE	+	+	+	+	+	+	+
HEADACHE	+	+	+	+	+	+	+
MEMORY PROBLEMS	+	+	+	+	+	+	+
SLEEP DISTURBED	+	+	+	+	+	?? due to medicines	+
SKIN PROBLEMS	+	+	+	+	+	burning skin	+
PROBLEMS CONCENTR[n]	+	+	+	+	+	+	+
DEPRESSION	+	+	+	+	+	+	+
MUSCLE PAIN	+	+	+	+	+	+	+
DIZZINESS	+	+	+	+	+	+	+
G.I. - Irr. Bow.	+	+	+	+	+	+	+
PERIPH PARESTHES/ TINGLING	+	+	+	+	+	+	+
CHEM/ENVIR SENSITIVITY	+	+	+	+	+	Reported	_
EYE PROBLEMS	+	+	+	+	+	+	+
ANXIETY	+	+	+	+	+	+	+
TACHY&/OR CHEST PAIN	+	+	+	+	+	+	+
BREATHING PROBLEMS	+	+	+	Reported	+	+	+
LIGHT SENSITIVITY	+/-	+	+	Reported	+	+	-

+ Literature. Reported = Anecdotal

Adapted from Jackie Burkhead

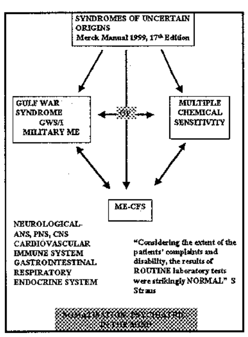
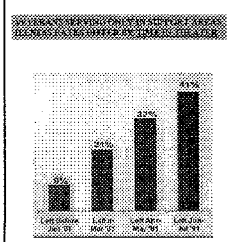


Table 4 Known Effects of the Gulf Exposures on the Different systems of the Body

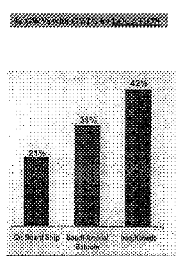
SYSTEM	VACCINES	PB	OPs/CBs	Pyreth	Lind	NA	Mx	DU	OS
CNS	X	X	X	X	X	X	X	X	X
PNS	X	X	X	X		X	X		
ANS		X	X	X		X	X		
CV		X	X		X	X			
BLOOD	X	X	X		X	X	X	X	X
IMMUNE	X	X	X					X	X
GI	X	X	X			X	X		X
M/S SKEL	X	X	X	X		X		X	X
RESPIRAT	X	X	X			X	X	X	X
SKIN	X	X	X	X		X	X	X	X
RENAL	X	X	X		X			X	
LIVER			X		X			X	
ENDOCRINE	X	X	X		X	X		X	
GENES	X		X			X	X	X	X

CNS = Central Nervous System, PNS = Peripheral Nervous System, ANS = Autonomic Nervous System, CV = Cardio Vascular System, GI = Gastrointestinal System

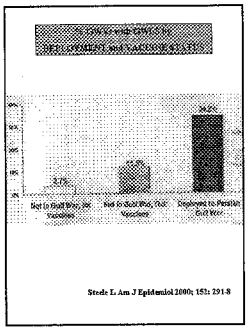
PB = Pyridostigmine Bromide, OPs = Organo Phosphates, CBs = Carbamates, Pyreth = Pyrethroids, Lind = Lindane, NA = Nerve Agents, Mx = Mixtures of agents, DU = Depleted Uranium, OS = Oil and Smoke



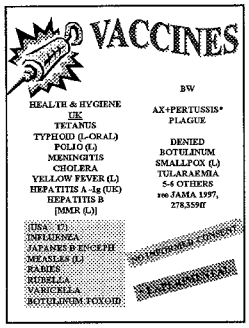
Steele L Am J Epidemiol 2000; 152: 291-8



Steele L Am J Epidemiol 2000; 152: 291-8



Steele L Am J Epidemiol 2000; 151: 291-8



- TOO MANY GIVEN SIMULTANEOUSLY
- TOO CLOSE TOGETHER
- WRONG COMBINATIONS- Ig + LIVE VACCINE
  - Cholera + Yellow Fever
- IN DEFIANCE OF ESTABLISHED PROTOCOLS

BNF 1999, Martindale Extra Pharmacopoeia 30th Edition, 1993

3 UK STUDIES HAVE FOUND:
1. 3 + POLIO CASES OF SYPHILIS AMONG CHILDREN
2. [illegible] ASSOCIATION OF SYMPTOMS WITH VACCINES

Unwin, C. et al *Lancet*, 1999, 353, 169-178.

Hotopf A, et al *BMJ* 2000;320:1363-7.

Cherry N, et al. *Occup Environ Med* 2000, 58, 291-298.
Occup Environ Med 2000, 58, 299-306.

- ONLY 28% OF RECORDS SURVIVE.
- MANY INCOMPLETE- NOT UP TO DATE.
- IGNORED IMMEDIATE ILL AND EARLY
- CASUVACCED FOR VACCINE REACTIONS
- ONLY 2 VACCINES GIVEN TOGETHER - STRONG ASSOCIATION WITH CDC MULTI-SYMPTOM SYNDROME.
- PTSD NOT SIGNIFICANT FACTOR ASSOCIATION GREATEST BEFORE DEPLOYMENT
- THERE WAS NO EXCLUSIVE ASSOCIATION OF SYMPTOMS WITH VACCINES GIVEN IN THEATRE

THE GULF VETERANS WERE CREDIBLE AND ACCURATE WITNESSES

[illegible]

Rook and Zumla Lancet 1997, 349, 1831-33

ACCINE	18/9/00	11/12/00
Cholera	May have received	FMed 4 1st 28/11/90 assumed 2nd 3/1/91
epatitis B	Likely 3x over 6 months	PAMPAS as amended by SFR 27/12/91 should read 27/12/90 (Trout)
Yellow Fever	Likely	PAMPAS as amended by SFR 27/12/91 should read 27/12/90 (Trout)
Typhoid	Should have been given with tetanus	PAMPAS as amended by SFR 27/12/91 should read 27/12/90 (Trout)
Tetanus	1x likely 27/12/91 (corrected to) 27/12/90 but 2x on 7/1/91 unlikely/disputed	PAMPAS as amended by SFR 27/12/91 should read 27/12/90 (Trout)
epatitis A ammaglob	May also have been given	Not mentioned
Polio	Likely -cannot categorically state he did not have 2x 7/1/91	PAMPAS as amended by SFR 27/12/91 should read 27/12/90 (Trout)
eningitis A & C	Likely	May have received 3/1/91
Plague	Could have received	PAMPAS as amended by SFR 27/12/91 should read 27/12/90 (Trout)
Anthrax	Likely with Pertussis see below	PAMPAS as amended by SFR 27/12/91 should read 27/12/90 (Trout) 2x Impossible only authorised 2/1/91
Pertussis	Significantly under recorded Assuming 1x 7/1/91, 2x 28/1/91 3x just possible but not 13/2/91	PAMPAS as amended by SFR 27/12/91 should read 27/12/90 (Trout)
	Asks for documentation!	Immunisations at Seaton – possible but n records!

8 VACCINES ON 1 DAY! RECORDS MISSING

THE INDEPENDENT PANEL FOR THE ASSESSMENT OF GOVERNMENT RESEARCH INTO THE POSSIBLE INTERACTIONS BETWEEN NAPS AND VACCINES

The Panel has been chosen to oversee studies in animals

-GUINEA PIGS (PORTON)

-MICE(NIBSC)

-MARMOSETS (PORTON)

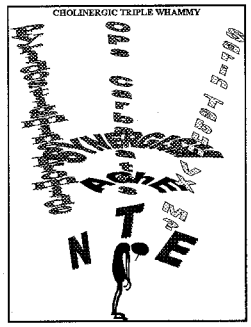
[illegible]

PROFESSOR GRAHAM ROOK

ROYAL FREE AND UNIVERSITY COLLEGE MEDICAL SCHOOL, LONDON

CO- AUTHOR OF THE ROOK-ZUMLA HYPOTHESIS WILL COMMENT ON THE IMPACT OF THE ROLE OF VACCINES IN GWVs HEALTH

CHOLINERGIC TRIPLE WHAMMY



[redacted]

ORGANOPHOSPHATES- OPs

DENIED - APOLOGISED

WIDELY USED

DIAZINON, MALATHION. SOME UNKNOWN

NO PROPER PROTECTION

1 HSE TRAINED OPERATIVE DIAGNOSED BY MAP AS OP POISONED

AGRICULTURE/ FISH CIVILIAN USAGE- HIGH USAGE- CONTROVERSIAL

[redacted]

PYRETHROIDS

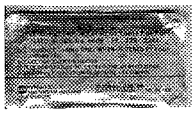
LINDANE

DEET

[redacted]

Abou Donia et al 1996-2002

IDENTIFIED AS MAJOR FACTOR AMONG UK GWVs- Cherry et al 2001



[redacted]

Golomb B. Rand Report,1999- 83 pages of references,

- PB cannot be ruled out as a possible contributor to the development of unexplained or undiagnosed illness in some PGW (Persian Gulf War) veterans……
- Uncertainties remain remain concerning the effectiveness of PB in protection of humans against nerve agents……
- The use of PB may reduce somewhat the effectiveness of post-exposure treatment for NON-SOMAN nerve agents..
- The issue is a complex one, involving trading off uncertain health risks- but risks now shown to be biologically plausible- against uncertain gains from the use of PB in the warfare setting.

See also Cherry et al 2001

[redacted]

NERVE AGENTS -SARIN, TABUN, VX- NO SOMAN !!

OPENING AIR WAR - DEMOLITION- SCUDS

[redacted]

EYE WITNESSES REPEATEDLY CONFIRM PRESEN NERVE AND MUSTARD AGENTS

CZECH TEAMS AND EQUIPMENT CONTINUALLY DIS

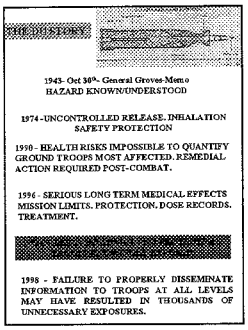
DOES LOW LEVEL EXPOSURE GIVE RISE TO CHRONIC DAMAGE ? -YES - 1978 ONWARDS !

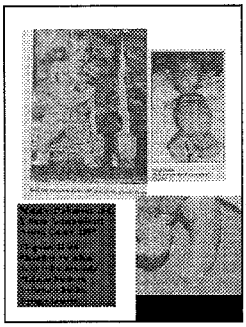
Johnson A. Gulf War Syndrome, 2001 for useful and brief summary

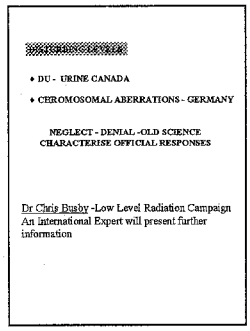
[redacted]

Dr Mike Mackness - PARAOXONASE

Dr Goran Jamal - NEUROLOGY


THE HISTORY
1943- Oct 30th- General Groves-Memo
HAZARD KNOWN/UNDERSTOOD
1974 -UNCONTROLLED RELEASE. INHALATION
SAFETY PROTECTION
1990 - HEALTH RISKS IMPOSSIBLE TO QUANTIFY
GROUND TROOPS MOST AFFECTED. REMEDIAL
ACTION REQUIRED POST-COMBAT.
1996 - SERIOUS LONG TERM MEDICAL EFFECTS
MISSION LIMITS. PROTECTION. DOSE RECORDS.
TREATMENT.
1998 - FAILURE TO PROPERLY DISSEMINATE
INFORMATION TO TROOPS AT ALL LEVELS
MAY HAVE RESULTED IN THOUSANDS OF
UNNECESSARY EXPOSURES.




• DU - URINE CANADA
• CEROMOSOMAL ABERRATIONS - GERMANY
NEGLECT - DENIAL -OLD SCIENCE
CHARACTERISE OFFICIAL RESPONSES
Dr Chris Busby -Low Level Radiation Campaign
An international Expert will present further
information

MEDICAL ASSESSMENT PANEL

Some 3000 GWVs have been seen by the Panel and several papers and letters written by the various teams serving on the Panel since 1996

The latest paper is extraordinary in claiming that of the last 1000 veterans seen by the Panel

80% were well [with SYMPTOMS or ORGANIC DISEASE]

SOMATISATION

WAR SYNDROMES

EXPLAINED GWS/I

MOTOR NEURONE DISEASE - 2-3 TIMES

CANCER OF KIDNEYS >12 TIMES CIVILIAN

CHRONIC LYMPHOCYTIC LEUKAEMIA > 10 TIMES

THERE APPEAR TO BE NO RECORDS OF ANY OF THESE AND OTHER DISEASES BEING KEPT CENTRALLY BY MAP. WHY NOT ?

Lee et al J Roy Army Med Corps 2000, 147, 153-160 see also Hooper Response attached

CONCLUSIONS

1. THERE IS A GULF WAR SYNDROME

2. IT IS NOT A RESULT OF SOMATISATION OR A MANIFESTATION OF A GENERAL WAR SYNDROME

3. IT IS NOT PRIMARILY A RESULT OF PTSD.

4. IT HAS MULTIPLE CAUSES NOT A SINGLE CAUSE.

5. IT IS AN ORGANIC ILLNESS RESULTING FROM THE UNIQUE MULTIPLE EXPOSURES SUFFERED BY GWVs.

Haley et al 2000, 200, VA2002, PAT June 2002

A Response to
Clinical Findings of the second 1000 UK Gulf War Veterans, GWVs, who attended the Ministry of Defence's Medical Assessment Programme, MAP.

Lee HA, Gabriel R, Bale AJ, Blatchley NF. *J R Army Medical Corps* 2000, **147**, 153-160

By Professor Malcolm Hooper Chief Scientific Advisor to the Gulf War Veterans

This paper was described as bizarre by Lord Clement-Jones in a recent House of Lords debate (LD0028-PAG1/53)

It purports to offer reassurance to the GWVs and by a 'sleight of hand' reports that of the last cohort of 1000 troops examined in the MAP 80% are well. I find it disturbing that there is an attempt to provide justification of this conclusion by the use of a cross-referencing group that re-examined the diagnoses of the authors.

"Sleight of Hand"
I use this term to encompass the bizarre use of numbers and definitions which are given
204 veterans are described as UNWELL
796 veterans are described as WELL but of these
384 are described as WELL WITH SYMPTOMS
311 are described as WELL WITH ORGANIC DISEASE
101 are therefore WELL in any common sense definition of health. ie. **10% NOT 80%.**
By any stretch of the imagination this reporting is bizarre and novel as well as seriously misleading. It could be seen as a calculated attempt at deception.

The definition of well is
"functioning in a fully competent manner" – this in turn leads to a further definition of functional status "the degree of ability to work, play sports, maintain a home, and to perform these activities free of physical or mental limitations".

"Well completely" equals "asymptomatic" but also includes veterans "who wished to discuss the possibility that Gulf service might have affected their health or that of their partners, their children or future children." **This number is not given. If this number is 101 than ALL the veterans seen are ill.**

"Well with symptoms" refers to veterans "who present with symptoms but were able to function in a FULLY competent manner."

"Well with incidental diagnoses" includes "patients with recognised CURRENT or PAST disease (organic or psychiatric) whose symptoms are well controlled or have remitted and were functioning with normal physical, psychological and social capacities"
Some examples of organic disease are diabetes mellitus, bronchial asthma and eczema. The only comment on these is that asthma, "occurring *de novo* six months after return from the Gulf was not considered to be related to Gulf service."

- Such a statement begs all the question about the origins/causes of these organic diseases. For example the identification of reduced levels of paraoxonase in GWVs (Haley *et al,* 1999; Mackness *et al,* 2000)- see below.
- The onset of chronic illnesses is usually insidious and extends over many months. MAP was only set up in 1996 and until that time the diagnosis of any illness was left to the General Practitioner or Hospital Consultant both of whom were in the invidious position of having incomplete or no medical records to help them in their consideration of a sick veteran. How can there be any certainty or validity about the 6-month period.

"**Unwell** had active disease or symptoms interfering with daily living"

The numbers and types of symptoms are given and have much in common with other lists (Nicolson, 1997 and 2002, Haley *et al,* 1997c, Unwin *et al,* 1999) and fit the category of Syndromes of Uncertain Origins (Merck 1999) or Signs and Symptoms of Ill-Defined Conditions, SSIDC (War Pensions Agency) and includes ME-CFS (myalgic encephalomyelitis-chronic fatigue syndrome), FMS (fibromyalgia), and MCS (multiple chemical sensitivity). This paper introduces yet another phrase for these symptoms, Multiple Unexplained Physical Symptoms, MUPS.

PTSD is the most abundant diagnosis although for a significant number of veterans no psychiatric assessment was available even when it had been requested! This raises questions about the confidence that can be placed in some of these diagnoses. The paper claims that additional cases of PTSD may be among those with multiple unexplained physical symptoms. This is to ignore work in the UK, Jones DA, 1997, and USA, Haley et al, 1997c, 2000, that demonstrates PTSD is not a major factor in most cases of Gulf War Illness/Syndrome.

The group under discussion has a greater proportion of serving soldiers (450 as against 330) than the first 1000 (Coker et al, 1999) and a comparison table makes interesting reading.
In some cases there are a greater number reporting symptoms in the second 1000 than in the earlier group, joint and muscle pain, fatigue, cognitive, headaches and migraine, sensory loss, skin lesions, dizziness and blackouts, and colds and flu'; and also no symptoms. Palpitations and dental symptoms appear for the first time as a separate item.
In contrast some symptoms are less frequent among the second 1000 veterans; ENT and genitourinary tract problems.
The remaining eight symptoms, remain of similar incidence +/- 2%.

A battery of routine tests is listed briefly and is of little value in assessing the breadth of individual tests. There is no evidence of any special tests being commissioned eg. MRI or SPECT scans or more specialised tests that have been reported by other investigators, eg. MRS scans, Haley *et al,* 2000.

The paper concludes that there is no evidence for a unique Gulf War Syndrome in contrast to the evidence presented by Haley *et al,* 2001. Such a conclusion is not justified

by the evidence which clearly shows very close symptomology with a number of syndromes of uncertain origin. It is disingenuous to dismiss GWS because of the lack of any single identifiable cause. None of the 'syndromes of uncertain origin' have a single cause yet they are not dismissed for this reason.

There is only a brief consideration of birth detects which relies on a now discredited paper (Cowan *et al*, 1997). This paper was shown to be fatally flawed by Pat Doyle of the London School of Hygiene and Tropical Medicine (Doyle *et al*, 1997) who identified the following weaknesses-

- It considered only live births
- There was no data on foetal death
- No data on terminations because of foetal abnormalities.

This paper has now been superseded by a report from the Veterans' Administration (Kang *et al*, 2001) that also criticised the Cowan paper and concluded that, "The risk of veterans reporting birth defects among their children was significantly associated with veteran's military service in the Gulf War." Increased numbers of birth and peri-natal defects were reported among a sample of 15,000 veterans. This paper also included the statement that, "UK female veterans reported more miscarriages than non-Gulf veterans (odds ratio [OR] = 3.95; 95% confidence interval [CI] = 1.0-12.65", King's College Survey, 1999). It is disappointing that such an important statement has not been made known in the UK- why suppress this vital information?

This report is in agreement with the well known high incidence of birth defects among USA veterans with four times the incidence of Goldenhar's syndrome being reported (ABCD, 2000). Among UK veterans an unusual frequency of birth defects is surfacing (Moriarty, 1998) and there are reports of very large increases, 3-5 fold, in birth defects and childhood cancers among Iraqi children (Guenther, 1999; El-Bayoumi, 1999). Anophthalmos has been found to be 250,000 times higher in a cohort of children studied in Iraq (De Sutter, 2001).

It is inconceivable that Professor Lee and his team should be unaware of these facts and it is clear that veterans should be counselled about the possibility of increased birth defects in children born after the Gulf War. It is clear that MAP has failed the Gulf War veterans by not acting in this way.

Psychosomatic and Somatisation Disorders

Referring to the work of Engel *et al*, 1999, it is proposed that multiple unexplained symptoms in primary care and the community are possible markers of psycho-social stress rather than medical illness and as the number of symptoms rose so did the likelihood of a psychiatric disorder.

I would make the following points in response.

- This comparison does not compare like with like; a criticism often levied against other studies in the field of veterans' health.
- The greater incidence of all symptoms among GWVs would, in this light, indicate that the troops going to the Gulf were in some way more susceptible to psycho-social illness compared with era and non-deployed troops. I find this idea repulsive and insulting.

- The track record of somatisation is 'dodgy' to say the least. Previously well-recognised and now fully accepted diseases were ascribed to somatisation, eg diabetes, multiple sclerosis, and Parkinsonism. Such a diagnosis is rather one of baffled ignorance, in most instances, which often seeks to avert any search for underlying organic disorders by a psychiatric labelling. Cognitive Behavioural Therapy and Graded Exercise, was being advocated in the treatment of GWI/S (discussions at Walter Reed hospital with Lt Col Charles Engel on previous visit, 2nd-6th October 2000). The recent debate in the UK about ME-CFS and the Chief Medical Officers report on this related syndrome follows a similar pattern.
- Claims of somatisation lead to even more bizarre claims that 'Gulf War Illness is caught by word of mouth', Showalter, 2000.

War Syndromes

The assertion that GWI/S is no different from the syndromes recorded in other conflicts is supported by reference to a paper by Hyams et al, 1996, which tracks post war illness from the American Civil War to the Gulf War. A similar attempt is made in a paper by Jones *et al,* 2002.

- These paper begs all the questions around the **2-3 fold excess** of symptoms found repeatedly among GWVs – why is the Gulf War so different?
- A careful examination of the deaths/illness in some of these earlier conflicts shows that infection and natural disease caused greater casualties than conflict, Anon, 1861.
- The 'blindingly' obvious facts of the massive toxic exposures suffered by the GWVs are ignored. Much of the toxic load came from protective measures used, some of which were unproven, eg. pyridostigmine to protect against nerve agent exposure and pertussis as an adjuvant with anthrax vaccine. In the latter case, there was evidence of serious adverse effects in mice from such a combination in 1990, before the vaccines were widely given, MOD 1997.

Serious Omissions

The most damaging and disturbing aspect of this paper is the failure to recognise a large body of published, peer-reviewed work that clearly points to extensive neurological damage, Baumzweiger , 1998: Haley 1997a-c, 1999, 2000, 2001, related to pesticides and pyridostigmine bromide. Problems greatly exacerbated by synergism between pesticides and stress, Abou-Donia and colleagues, 1996, 2000, Abu-Qare, 2001.

The significant immunological deficits suggested by a clear association with vaccines, Unwin *et al*, 1999; and Cherry *et al* 2001, and the presence of mycoplasma in up to 45% of veterans, Nicolson, 1997, 2002, is ignored.

The important work by Urnovitz, on Human Endogenous RetroViruses, HERVs, 1992,1999 and genomic damage, 2002, is not recognised. Neither is the work of Nass, and her co-workers on anthrax vaccine quality and adverse effects, Sidel 1998, Nass, 1999.

UK clinical studies by Jamal, 1996, 1998, showing neurological damage in both the peripheal and central nervous system are ignored as is the work of Mackness, 2000, on the key enzyme, paraoxonase. This enzyme plays a crucial role in organophosphate detoxification is protective against diabetes and aethersclerosis, Mackness 2000, 1998,

1997. In view of the identification of diabetes as a significant disease in some veterans the failure to do this simple test is disturbing.

There is no comment on the incidence of rare clinical conditions that occur in excess among Gulf veterans, eg. ALS. The high incidence of this disease was first flagged up in the Government Reform committee report, 1997, and recent data has validated this early observation, Feussner, 2002. It became clear in subsequent discussions with MAP and the MOD, MOD 2002, that there were some five cases of ALS known among Gulf veterans. Such numbers among the 53,000 UK troops are very high. If UK statistics are the similar to those in the USA then 0.20-0.25 per 100,000 per year would be expected in the under 40 age group, Government Reform Committee, 2002. There is therefore approximately a similar 2-fold excess of motor neurone disease among UK veterans.

Three cases of renal cancers among UK veterans were discovered, fortuitously, from routine ultrasound scans, among the 3000 troops examined by MAP, Lee 2002. Because of early detection surgical removal of the kidney/cancer was possible and no recurrence or metastases have appeared to date. Renal cancer is indeed rare in men in the 20-40 year age group. Three cases in 3,000 represents about a 12-fold increase according to Dr Chris Busby using civilian figures, which are all that are available. One death from renal cancer is also known. It is surprising that Professor Lee, a renal specialist, has not recognised the importance of his own observations that are not included in this paper. Questions about the incidence of nephrotic syndrome and lupus, both rare conditions in young men, were also raised but no information was forthcoming. Following a consideration of PON1 and its protective role against OP poisoning, in diabetes and atherosclerosis it was disclosed that no information about the incidence of such diseases was available or being collected.

Five cases of lymphocytic leukaemia have been reported among the 2,500 veterans on the National Gulf Veterans and Families Association, NGV&FA, database, Rusling 2002. A preliminary calculation based on figures in the Oxford Textbook of Medicine indicates that this is a 6-10-fold excess over civilian cases for the same age groups.

Conclusion

This paper represents continuing attempts by the MOD/MAP to minimise the illnesses of the Gulf War Veterans. It fails to engage with a great deal of evidence that is present in the literature indicating strong links with vaccines, pesticide, nerve agent, depleted uranium, pyridostigmine and oil and smoke exposures.

For this reason alone does not make a serious contribution to the debate but rather detracts from it. It is yet another piece of specious medical research, Hooper 2002, Jones *et al,* 2002. It is not surprising that the GWVs have advised their members to boycott the MAP. In the light of the evidence presented in this paper I can only advise them to continue this policy. When MAP carry out clearly unbiased studies that reflect all the knowledge available on GWI/S only then can it win the trust of veterans.

A new climate towards GWI/S is emerging in the USA, Government Reform, 2002, after prolonged attempts by the DOD and VA to obfuscate all the issues around GWI/S by propaganda, poor scientific studies, and extensive waste of huge amounts of money. For a similar change to take place in the UK a Public Inquiry is essential to bring into the open all the known facts without fear or favour. Only then can justice be done and be seen to be done. Only then will our GWVs receive the consideration and material support they

have already earned and deserve. The obduracy and deception of the MOD exemplified by the helicopter crashes on the Mull of Kintyre suggests that this will only be achieved if there is a considerable change of mind and heart in Government, particularly, in the MOD.

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However, when combined there was evidence of **severe loss of condition and weight loss in animals.** (Emphasis added)
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13/06/02

The Editor

Jones E *et al.* Post-combat syndromes from the Boer war to the Gulf war: a cluster analysis of their nature and attribution. *BMJ* 2002, **324**, 321-4 [1], is an example of specious medicine and science that ill-serves the needs of the Gulf war veterans, GWVs, and makes light of their suffering and distress. It serves a military-political-corporate agenda and is unworthy of the British Medical Journal. My evidence?
It repeats an old story[2] that has previously been used to suggest Gulf war syndrome/illness, GWS/I is nothing exceptional and is not associated with any specific exposures but rather to the general consequences of being engaged in warfare.
This thesis was rejected with contempt at the recent hearing in the House of Representatives on January 24th 2002[3], at which I was present as an observer. This committee challenged the Department of Defense, DoD, and the Veterans Administration, VA, to account for the very poor returns on the $350 million spent in investigating GWS/I by these organisations. Much has been spent on propaganda and assertion rather than careful investigation of the sick veterans. A letter from the DoD, from Dr Vesser, indicated that further investigation was not necessary since GWS/I was simply another reflection of war syndromes. Dr Vesser was associated with the "stress team" that had sought to present GWS/I as neuropsychiatric and/or somatisation illnesses without any organic basis. This was seen as a wilful refusal to face the now overwhelming facts associated with GWS/I. With the change in leadership in the USA official attitudes have changed radically.

A recent paper from the Medical Assessment Programme[4] (Lee 2001) uses the same DoD ploy to explain the "bizarre" conclusion[5] that 80% of the latest cohort of 1000 troops assessed were well- but well with symptoms or organic disease. Somatisation disorders were also invoked in this paper. It ignores all the evidence opposing these interpretations. The GWVs now boycott MAP which they regard as untrustworthy.

Jones *et al* by, combining different data sets from different eras and in some cases using a very small number of records, ignoring the particular environment of the different theatres of war, and the changes in scientific and medical knowledge, appear to be engaged more in obfuscation than clarity. For example, the Guards Memorial to the Crimean war has been described as a lie because it honours the 2162 men at Alma, Inkerman, Sebastopol who "fell during the war with Russia 1854-1855-1856". The lie is identified in the official returns, which show that 419 died in battle or from wounds received in battle. The remaining 1713 died from fever, dysentry, cholera, including some 212 through scurvy and frostbite[6]. What would be the chronic health effects of these infections and trauma?

War syndromes will arise from the exposure of naïve subjects to previously unencountered biological and chemical toxins in a new environment. The Gulf war was indisputably the most toxic war in Western Military history[7 8]. The multiple and excessive exposures to vaccines (wrongly administered and experimental in some cases), pyridostigmine bromide (used experimentally) and pesticides (initially denied), chemical war

agents (still denied by the UK, but not the American, government), depleted uranium dust (known at the time to be hazardous) and oil and smoke and other toxins underlie the excessive levels of symptoms found among GWVs. The impact of these toxins on gene expression is now proposed as a comprehensive mechanism for the pattern of symptoms and illnesses identified among GWVs [9].

A vast amount of incontrovertible evidence of organic damage, in peer-reviewed literature is ignored[9-17]. Haley and colleagues using clinical tests and magnetic resonance spectroscopy, MRS, demonstrated extensive and comprehensive neurological damage with significant biochemical changes in the brain[10 11]. The latter has been confirmed in an unpublished study from the DoD[18] that was claimed to have been deliberately withheld[19].

Also ignored are a number of recent epidemiological reports. Steele *et al*[20] found that the proportion of troops experiencing GWS/I depends, among other things, on location- with some 42% of those furthest forward and remaining longest in the battlefield area being affected. The same study also shows that 12% of vaccinated troops that were not deployed also have GWS/I. Among UK veterans, Cherry *et al*[21] found vaccines and pesticides to be exposures that were strongly associated with the highest number of symptoms and confirmed the work of Unwin *et al*[22], with regard to the role of vaccines but extended that analysis.
A recent epidemiological study with advanced statistical analysis by Haley *et al*[23] provides evidence for the existence of a single GWS using syndromes associated with pesticides, nerve agents and pyridostigmine bromide tablets.

Immunological studies briefly reported to the Shay's hearing[24] claimed that a predicted immune imbalance[25] has now been confirmed among UK GWVs.
Evidence is also emerging of excess levels of rare diseases among GWVs. An American study has found twice the prevalence of motor neurone disease among their troops- some 40 cases to date[3 26]. A similar incidence is indicated from provisional unpublished figures, five at present, in the UK.
Three cases of renal cancers among UK veterans were discovered, fortuitously from routine ultrasound scans, among the 3000 troops examined by MAP[27]. A provisional calculation shows that this represents a 10-12-fold increase over civilian figures for the same age groups[28].
Five cases of lymphocytic leukaemia have been reported among the 2,500 veterans on the National Gulf Veterans and Families Association, NGV&FA, database. A preliminary calculation based on figures in the Oxford Textbook of Medicine[29] indicates that this is a 6-10-fold excess over civilian cases for the same age groups. Whilst these figures are only provisional they represent defined illnesses that are the emerging "tip of the iceberg" recognised by Congressman Bernie Sanders of the Shay's Subcommittee.

In the face of all this evidence to attempt to suggest that GWS/I is neuropsychiatric and can be accommodated by terms such as neuraesthenia, neuropsychiatric and somatic symptoms is unacceptable, cruel, and biased. The support from major funding agencies for such work and peer review by uninformed referees only compounds the folly and shame that this paper represents. In the USA it was the introduction of private funding, particularly, $2 million from the Perot Foundation, that allowed independent research to be initiated that exposed the grave inadequacies of the officially funded studies.

The present paper, supported by funds from the DoD, colludes with Government, military and the corporations that prosecuted the war and reneges on the "debt of honour" recognised in the House of Commons Select Defence Committee report[30]. The public inquiry long called for by the Royal British Legion is now essential to clean out these 'Augean stables'.

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This has now been posted on the Electronic mail site for this paper

Mr. SHAYS. Thank you. A wonderful job.

STATEMENT OF GRAHAM ROOK

Dr. ROOK. First I would like to thank you for this opportunity to address you on this question. I want to start by making the point that Gulf War illnesses are going to have extremely complex causation and we must not think of the different hypotheses being in competition with one another. The effects seen in individual veterans will be an "integration" of all the usual exposures to which they were subjected in the context of individual histories and genetic backgrounds.

Now, you have heard a little bit from Malcolm about the epidemiological links which seem to exist between vaccines and Gulf War illness, so I do not need to go into those in detail but you will remember that it appears even if not deployed, there were more symptoms and it also seems there was a dose-response relationship with symptom scores and the experimental vaccines, plague and anthrax administered with pertussis seems to be to blame. As well as that epidemiology there is a study which has been submitted for publication from Dr. Mark Peakman, a study of immunology superimposed on the epidemiological studies which Simon Wessely and his department has undertaken so there is a balance with the appropriate control groups and that study is showing significantly increased expression by peripheral blood lymphocytes, particularly interleukin 4 and interleukin 10. You might want to remember those two because they will turn up again.

Now, the hypothesis that we put forward in 1997 was that long-term changes in the balance of the immune system could be caused by multiple vaccinations. This would be exacerbated in psychologically and physically stressed individuals and also by the chemical exposures and this could lead to a diverse range of symptoms including mood changes. So, I am going to show you in the five years new types of information have come forward to show the hypothesis was not as crazy as it was thought originally and it is within the epidemiology and the immunology done.

Here is a slightly complex diagram. There are three players. On the left you have a bacterium and a list of components, it could be a vaccine, for instance. In the middle you have the antigen-presenting cell and on the right lymphocytes. Starting with the uncommitted lymphocytes which can turn into attaching lymphocytes, Th1 or Th2 or the green fellow there called Treg, the antigen-presenting cell is the one that tells ThO what to become, what pattern of immune response is actually needed, but it makes that decision on the basis I have drawn it, rather fancifully as a kind of keyboard, a large number of signals it gets from the bacteria, it is exposed; it is trying to decide which sort of organism it is and which sort of response is appropriate in response to that organism.

Say you played the chord of C sharp, you arrive at Th2 and with B flat you get another lymphocyte. With others you get regulatory cells. In the last few years it is clear that these are unrelated to alogens in the atmosphere or air zone cut content or because once these cells have picked up those signals they wander up into your spleen or other lymphoid tissues where they now have a different way of presenting what other antigens they receive.

What sorts of evidence do we have that bacterial components such as we find in a vaccine do indeed exert long-term systemic effects on immulogical responses? Firstly there is the animal model work. Much of it happened since 1997. Experimental models of "diseases of immunodysregulation." There is the immune system which has gone wrong. There the body is attacking itself where allergens are in the air and inflammatory bowel diseases attaching to the bowel. There are many listed in the statement showing you can block or enhance allergic disorders and autoimmune disorders by vaccines and microbial components and showing the induction of the regulatory T cells by the single injection of a bacterial component. With the regulatory T cells they turn off the response to something entirely unrelated to the bacterial vaccine itself.

The first author there is from a large pharmaceutical company and I will mention why that is a relevant point later. When we wrote the paper it was already known that from the consequences of routine vaccination of the public we could already suggest that certain vaccines were having an effect on the public, causing death in children, switching to Th2 status. The guy who announced that lost his job until a group in Baltimore proved him right and now it is no longer used. These are nonspecific effects on overall survival from all causes. Then if we—

Mr. SHAYS. Can I just add to this. Tell me why what you are saying is important? I need to put this into context.

Dr. ROOK. It is important because it was saying that giving a massive load of vaccines in the Gulf War could have systemic effect on their overall immune systems for many years after. It is important to show that we see it in the ordinary public;

just by giving ordinary vaccines we have an effect on the systemic system. The exploitation of beneficial effects of microbial components in clinical trials for treating diseases of immunodysregulation is going ahead at a great rate in allergic disorders-mycobacteria, lactobacilli, CpG motifs; DNA has been the subject of an $18 million deal by Pasteur. Here we have a type of effect of microbial components regulating the immune system, getting pharmaceutical companies to put hundreds of millions of dollars in it and yet we still have the problem of persuading war departments to accept it.

Now we have the Gulf War vaccination schedules. There is a huge amount of evidence given in my statement. This is an example of the overall child survival. You can see the blue line in children not given the vaccine; the dotted line, the BCG increased survival from all causes, partially offset by giving DTP as well. This is nothing to do with the diseases to which the vaccines are directed. They are non-specific vaccines.

The next element from the hypothesis was the effect of stress. What is so neat about all this is pretty much tending to become Th1 or Th2 or a regulated cell. But if you stress people they turn out more cortisol, more noradrenaline from the sympathetic system and cortisol and noradrenaline tell the system to turn off the Th1 cells and to turn on the Th2 cells and regulatory cells. Also, within the last couple of years Kevin Tracey in New York has realized that in fact acetylcholine is also a major regulator of these cell types.

So, if you give them that you will also be accelerating the acetylcholine and curiously I do not think Kevin Tracey has been brought into the dialogue on the matter but he is the one that knows more about this in the world.

[The statement of Dr. Rook follows:]

Multiple vaccinations and illness amongst Gulf War veterans

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Background

The original hypothesis

In 1997 we suggested that multiple vaccinations given over a short period of time, to individuals undergoing physical and psychological stress, might result in long term changes in the immune system (29). Specifically we suggested that there would be a shift in the balance of immunological mediators (cytokines) towards expression of Th2 cytokines (such as interleukin 4 (IL-4)). We also suggested that simultaneous exposure to organophosphates might have exacerbated this effect. Finally, we pointed out that a systemic change in cytokine balance would result in a very poorly defined set of symptoms, that would vary in different individuals, and simultaneously evoke mood disorders due to changes in the neuroendocrine system. Such a sequence of events could account for the lack of homogeneity in the symptoms reported in Gulf War veterans.

Recent epidemiological studies

Epidemiological studies have provided suggestive support for a link between multiple vaccinations and illness in Gulf veterans. Servicemen who had received the "experimental" vaccines against biological warfare agents (plague, and anthrax administered with pertussis) were more likely to report long-term symptoms (40). Receiving *multiple* non-biological warfare vaccines was also associated with an increased risk of illness (40). A subsequent study found a similar strong dose-response relationship between the number of vaccinations and the severity of symptom scores (8). Moreover, even amongst personnel who were never deployed in the Gulf, symptoms were more common amongst those who received vaccines than amongst those who did not (37). Finally, enquiries by GAO tend to confirm that illness is less common amongst French Gulf veterans, who were not vaccinated (http://www.house.gov/reform/ns/statements_witness/d02359t.pdf)

Recent laboratory studies.

Dr. Mark Peakman and colleagues, using funding from the US department of Defence, have carried out a study based on that which Rook and colleagues proposed in 1998. Using a case-control study superimposed upon a large epidemiological investigation, they have found significantly increased expression of IL-4 and of IL-10 by peripheral blood lymphocytes from symptomatic Gulf personnel, compared to appropriate control groups of veterans (36).

New background information

While these studies are not conclusive, they do suggest that vaccines were the crucial factor for certain forms of Gulf illness, and they justify taking a new look at the theoretical background for the hypothesis that was published in 1997 (29). In the intervening 5 years there have been striking advances in our understanding. The 5 areas discussed and updated below will be:-

1) Technical difficulties in the measurement of Th2 cytokines, particularly IL-4
2) The significance and correlates of Th2 cytokine expression
3) Known long term effects of infections and vaccinations
4) Interactions between vaccinations and stress; possible contribution of acetycholinesterase inhibitors
5) Interactions between the immune system and mood/behaviour

The significance and correlates of Th2 cytokine expression

One argument against the view that there might be a switch to Th2 cytokine expression in Gulf veterans has been the claim that any such switch would be accompanied by manifestations of allergic disorders and raised IgE. This is not correct. The most striking shifts towards Th2 cytokine expression are not seen in the allergies, but rather in cryptogenic fibrosing alveolitis (44), various cancers (10, 24, 48), and pregnancy (25), none of which is associated with allergic symptoms. This was the main argument used by the "Independent Panel for Research on Interactions of Vaccine and Drug Combinations", in the rejection of our application for funding in 1998. The use of this argument indicated that the Panel strikingly lacked knowledge of clinical immunology. A Th2 response may or may not be accompanied by allergic symptoms, and often is not. Interestingly, however, one recent epidemiological study of Gulf veterans did find an association between vaccination *after deployment* and subsequent development of asthmatic symptoms (19).

Technical difficulties in the measurement of Th2 cytokines, particularly IL-4

It is extremely difficult to measure expression of IL-4 accurately, and most studies fail to take into account either the short half-life of IL-4 mRNA (13) or the existence of a second cytokine, IL-4δ2 (32, 33), or the low concentrations and low mRNA copy numbers at which IL-4 is active (34). For instance, some publications fail to find IL-4 in patients or controls and so illogically conclude that it is not raised in the patients. Thus most quantitative studies of IL-4 expression in man before 2000 are faulty, and can be disregarded. The study by Skowera *et al.,* used a flow cytometric method that failed to distinguish between IL-4 and IL-4δ2, but importantly, was appropriately sensitive and quantitative (36), and did find increases in IL-4 and IL-10 expression in symptomatic Gulf veterans.

Known long term effects of infections and vaccinations

In 1997 it was already clear that certain vaccinations have long term effects on health that are not directly related to the actual target of the vaccine (29). Measles vaccine was a good example. The effects on overall survival (i.e. from causes other than measles itself) or on atopy, depended on the dose of measles vaccine used, and were different from the effects of the natural infection (1). Similarly there were hints that exposure to mycobacteria, possibly as BCG vaccine, were protective against allergies (35). More recently one of the same groups has shown that BCG vaccination (Th1-inducing) increases overall survival in west Africa, whereas DPT (diphtheria, pertussis, tetanus; mainly Th2-inducing) partially abrogates this beneficial effect (21), suggesting a situation more like that seen in Gulf veterans.

Epidemiological and laboratory studies in this area have progressed rapidly, not in relation to Gulf war veterans, but in relation to the civilian population. It was suspected that the rapidly increasing incidence of allergies in the rich western countries was in some way related to changing exposure to infections. Then it was noticed that not only the allergies, but also other classes of immunoregulatory disorder, were increasing in parallel. These include Type 1 diabetes, multiple sclerosis, and inflammatory bowel disease (22, 31, 38). In all of these diseases, the immune response is attacking targets that it should NOT attack, because immunoregulation is faulty. Several very good epidemiological studies have confirmed the links between microbial exposure and immunoregulation (for instance (27)), and the hypothesis has been repeatedly updated and reviewed (28, 46, 47). This correlation between changing microbial exposure and the increasing incidence of diseases of

"immunodysregulation" implies that certain microbial components, as a result of our evolutionary history, are involved in correct priming of immunoregulatory networks. Further support for this concept has come from the observation that a vaccine prepared from an environmental mycobacterial saprophyte, common in mud and untreated water, will treat a pre-existing allergic state in animals by inducing regulatory T cells (49). Moreover the same preparation will alleviate allergic symptoms in children (2). Organisms now implicated as beneficial in this respect include the mycobacteria, Schistosomes and Lactobacilli (2, 20, 47, 49).

The animal model used to look at the beneficial immunoregulation by mycobacteria (49) may provide some guidance as to how the possibly detrimental, Th2-biased, vaccine schedules involved in the Gulf might be investigated in the future. No appropriate investigations have yet been undertaken. A study in guinea pigs used reduced doses of the vaccines (though vaccine doses are not related to the weight of the recipient, and human doses could have been used) and no chronic stressor was applied, so the hypothesis was not investigated, and immunoregulation was not targeted (17)

- *Conclusions from new data on long term effects of vaccines*

  The "bottom line" is that microbial components are now known to exert powerful long-lasting effects on the regulation of the immune system. This is seen whether we study routine vaccination of human populations (21), experimental models (49), or therapeutic trials with vaccines in immunoregulatory disorders of man (2, 20). Therefore the bizarre, experimental vaccine schedules used in the Gulf might well have caused immunoregulatory dysfunction that would manifest itself differently in different individuals, particularly when administered against a background of pharmacologically active agents and stress.

Interactions of vaccinations and stress

Since 1997 our understanding of how stress modifies the immune response has increased markedly. It seems that all three branches of the stress circuitry (adrenals, sympathetic system and parasympathetic system) can exert potent immunomodulatory effects, and a consequence of this is a clear failure of vaccination to evoke the intended protective response in stressed humans or animals(12, 41).

Hypothalamo-pituitary-adrenal axis; cortisol release

The overall physiological effect of cortisol on lymphocytes, manifested for instance in the cortisol-mediated effect of stress (6) is to drive the immune response towards a Th2 cytokine profile (26). Newly responding naive T lymphocytes are deviated towards Th2, despite the fact that IFN-γ secretion by memory T cells is rather resistant to glucocorticoids (5). This switch to the generation of Th2 cells operates largely via effects on antigen-presenting cells, which in the presence of glucocorticoids may release IL-10 rather than the Th1-promoting cytokine, IL-12 (42, 43).

Interestingly, glucocorticoid hormones can also enhance development of regulatory T lymphocytes that release IL-10 (3). These would again inhibit the usefulness of vaccination, and probably lead to diminished ability to clear chronic infections.

Sympathetic nervous system; release of adrenaline and noradrenaline
Noradrenaline (and adenosine) released and from sympathetic nerve terminals operate in a similar way, since they also inhibit production of IL-12, and enhance production of IL-10 by antigen-presenting cells (14). Stimulation of β-2 adrenergic as well as A2 adenosine receptors results in increased cAMP levels and reduction of the production of TNFα, IL-12 and IFNγ. These effects can be mimicked by β2-adrenergic agonists. Moreover the appropriate receptors (β2-AR) are expressed on Th1 cells but not on Th2 cells (30). Stimulation of pro-inflammatory cytokines can also occur, perhaps when the signal is through α1-AR (18) or α2-AR rather than β2-AR (9), but the overall effect of catecholamines is a switch to Th2 and down-regulation of pro-inflammatory cytokines.

The parasympathetic nervous system; release of acetylcholine.
Recently a potent "Cholinergic anti-inflammatory pathway" has been described (4, 39). Signals travelling from the brain to the periphery via the parasympathetic nervous system result in release of acetylcholine. Acetylcholine potently inhibits release of cytokines such as IL-1β, IL-6, IL-18 but does not downregulate IL-10. This effect is so potent that it can abrogate endotoxin shock (38).

Possible contribution of acetylcholinesterase inhibitors
Since acetylcholinesterase is widely distributed, it is likely that simultaneous consumption of pyridostigmine bromide (PB) by Gulf veterans will have enhanced the immunological effect of peripheral acetylcholine, by prolonging its time of action.

Quite apart form this peripheral action of PB, entry of PB into the brain, if it occurred (though this is doubtful) would aggravate the situation (15). Central cholinergic neurotransmission is involved in the stress response, and entry of PB into the brain would augment stress-like symptoms still further (23), and consequently augment release of cortisol and noradrenaline too.

- *Conclusions on the effects of stress during vaccination.*

  All three pathways summarised above will have been active in the Gulf veterans while they were receiving their vaccinations, and the expected result is a distorted response to the vaccines, biased towards Th2 (secreting IL-4) and towards regulatory cells (secreting IL-10). These are the cytokines found to be increased in cells from sick Gulf veterans in the study of Peakman *et al* (36) Vaccines given to stressed subjects are unlikely to be effective, and may evoke prolonged cytokine imbalance.

Interactions between the immune system and mood/behaviour

Cytokine profiles affect mood and a number of other behaviour modalities such as sex, appetite and sleep. Twin studies show a correlation between depression and allergies (45). Pro-inflammatory cytokines induce "sickness behaviour", either by entering the brain where there is no blood-brain barrier (circumventricular organs etc), or indirectly by signalling from the periphery via afferent C fibres (11). Treatment of cancer or hepatitis patients with IL-2 or with IFN-α can lead to severe depression (7). Interestingly, not all patients receiving IFN-α develop depression, but a percentage of those who do not, instead develop mania when the treatment is withdrawn (16). This remarkable individual variation highlights the complexity of these effects. Effects like these almost certainly explain the common post-influenza depression. Therefore if some Gulf veterans have chronically distorted cytokine profiles, subtle changes in psychiatric function are to be expected, but these changes could be dramatically different in different individuals, further frustrating attempts to identify a discrete "syndrome".

• Overall conclusions

If the hypothesis paper published in 1997 in the Lancet were to be rewritten now, it would be much more forceful. On the other hand work towards testing the hypothesis in relation to the Gulf veterans remains incomplete. Several groups have provided compatible epidemiological data, and immunological data supporting the hypothesis have been submitted for publication, but this is not nearly enough to prove the case. For instance, psychological stress in disturbed Gulf veterans could *secondarily* lead to changes in cytokine profile similar to those observed.

- the hypothesis is not proved, and there is a "chicken and egg" problem.

- We now know that microbial components can have striking effects on immunoregulation, that are manifested as changes in "unrelated" medical conditions such as allergies, inflammatory bowel diseases, and autoimmune disorders.

- The aetiology of ALS is obscure, but it is increased in the Gulf veterans, and both ALS and the possible squalene antibodies could be autoimmune manifestations, secondary to faulty immunoregulation..

- We also have definitive proof of the effects of stress on vaccine responses and cytokine profiles, and knowledge about the ways in which cytokines may secondarily affect the brain.

- We now know that vaccines will not work properly if given to stressed service personnel.

- Vaccines should be given separately, and in a tranquil environment, well in advance of war.

I have not attempted to include uranium toxicity or oil fire smoke in my discussion, but that does not mean that I do not consider that they might be relevant. Nor have I considered insecticides except to the extent that some of them will have been acetylcholinesterase inhibitors.

- The different hypotheses put forward to explain the possible health problems of the Gulf veterans should not be regarded as competing with each other.

- The overall physiological responses of the veterans will have been an integration *of the multiple unusual exposures* to which they were subjected,

- The actual clinical manifestations will depend upon the genetic background and history of the individual.

As someone involved in clinical trials, I am forced to ask why military personnel are treated less well than civilians. If ordinary citizens had received an experimental drug and vaccine regimen, it would have been treated as a Phase 1 clinical trial, requiring intensive subsequent study and follow-up.

- So the MOD, DOD etc should, in advance, have designed a programme of physical examinations, blood sample storage (cells, and mRNA) and clinical follow-up, from a random sample of the veterans, to be applied immediately after their return.

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Gulf war illnesses; complex causation

- the different hypotheses put forward to explain Gulf war-related illnesses *are not competing* with each other

- the effects seen in individual veterans will be an "integration" of all the unusual exposures to which they were subjected, in the context of individual histories and genetic backgrounds

Epidemiological links between vaccines and Gulf war illness

- Experimental vaccines (plague, and anthrax administered with pertussis)

  Unwin et al, (1999) Lancet 353:169-178.

- *Multiple* non-biological warfare vaccines

  Unwin et al, (1999) Lancet 353:169-178.

- More symptoms if vaccinated, *even if not deployed*

  Steele, L. (2000) Am J Epidemiol 152: 992-1002.

- Dose-response relationship with symptom scores

  Cherry et al (2001) Occup Environ Med 58:299-306

Immunological findings in symptomatic Gulf war veterans

Significantly increased expression, by peripheral blood lymphocytes, of :-

- interleukin 4 (IL-4)
  -> Th2 lymphocytes
- interleukin 10 (IL-10)
  -> regulatory lymphocytes

Skowera, A., M. Hotopf, E. Sawicka, R. Varela-Calvino, C. Unwin, V. Nikolaou, L. Hull, K. Ismail, A. David, S. Wessely, and M. Peakman. (2002). T helper 2 type immune activation in Gulf War veterans with multisystem illness. **Submitted for publication.**

Gulf War Syndrome: is it due to a systemic shift in cytokine balance towards a Th2 profile?

Lancet (1997) 349:1831-1833

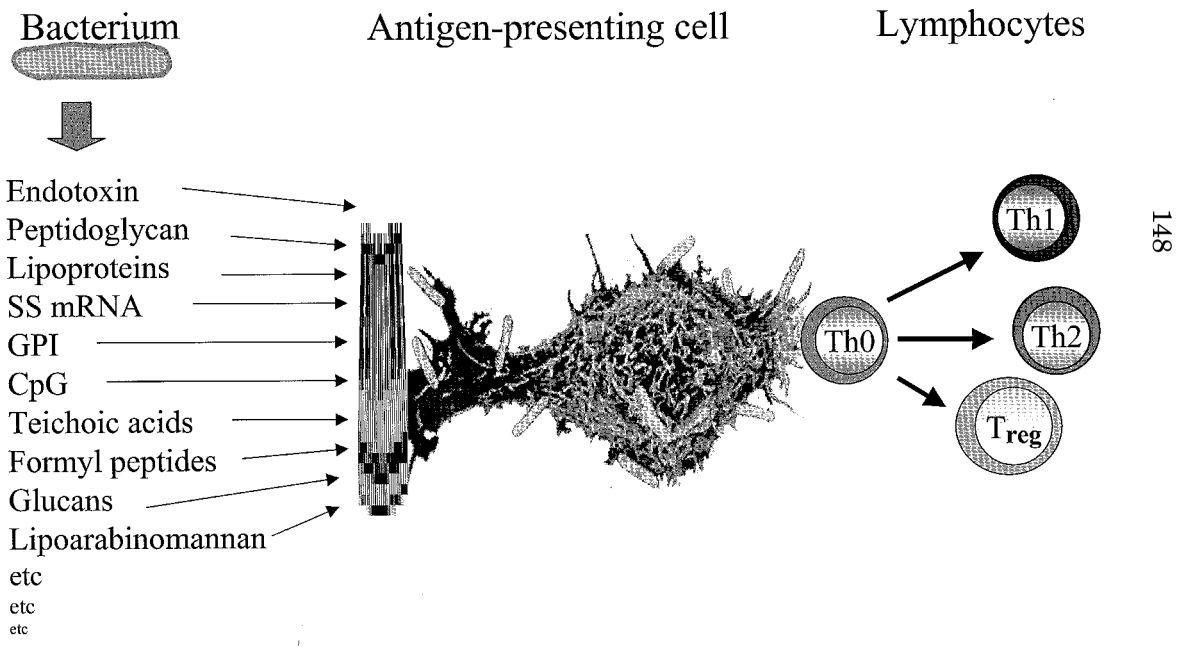
Long-term changes in the balance of the immune system could be caused by :-

1) multiple vaccinations
2) in psychologically and physically stressed individuals
3) exacerbated by chemical exposures

could lead to:-

4) a diverse range of symptoms, including mood changes

Adjuvant/immunoregulatory effects of microbial components



Evidence for systemic regulation of the immune system by vaccines. Animal models

• experimental models of "diseases of immunodysregulation".
(autoimmunity, allergies, inflammatory bowel diseases)

Vaccines and microbial components will:-

- *block* or *enhance* allergic disorders

- *block* or *enhance* autoimmune disorders

- induce regulatory T cells

Zuany-Amorim et al., (2002) Nature Medicine 8:625-9

Evidence for systemic regulation of the immune system by vaccines. Human studies

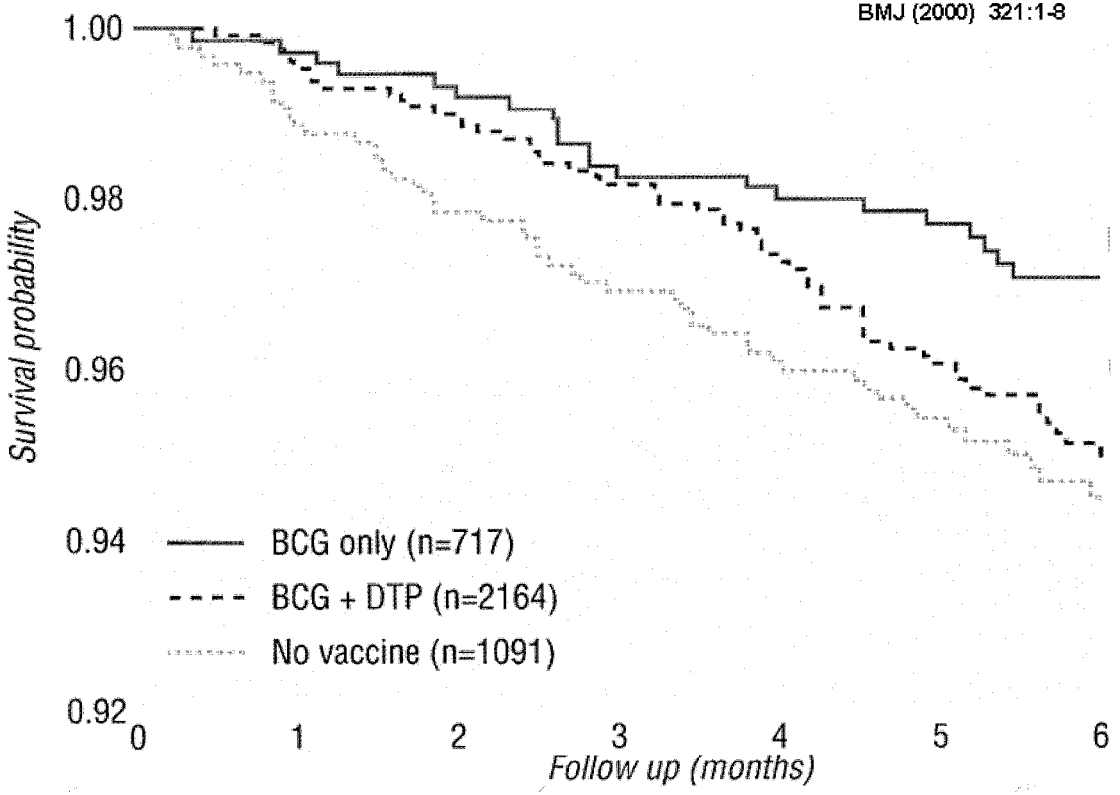
- consequences of routine vaccination of the public
  - increases (BCG) and decreases (DPT, high dose measles) in overall survival
  - increases (pertussis) and decreases (BCG) in the incidence of allergies

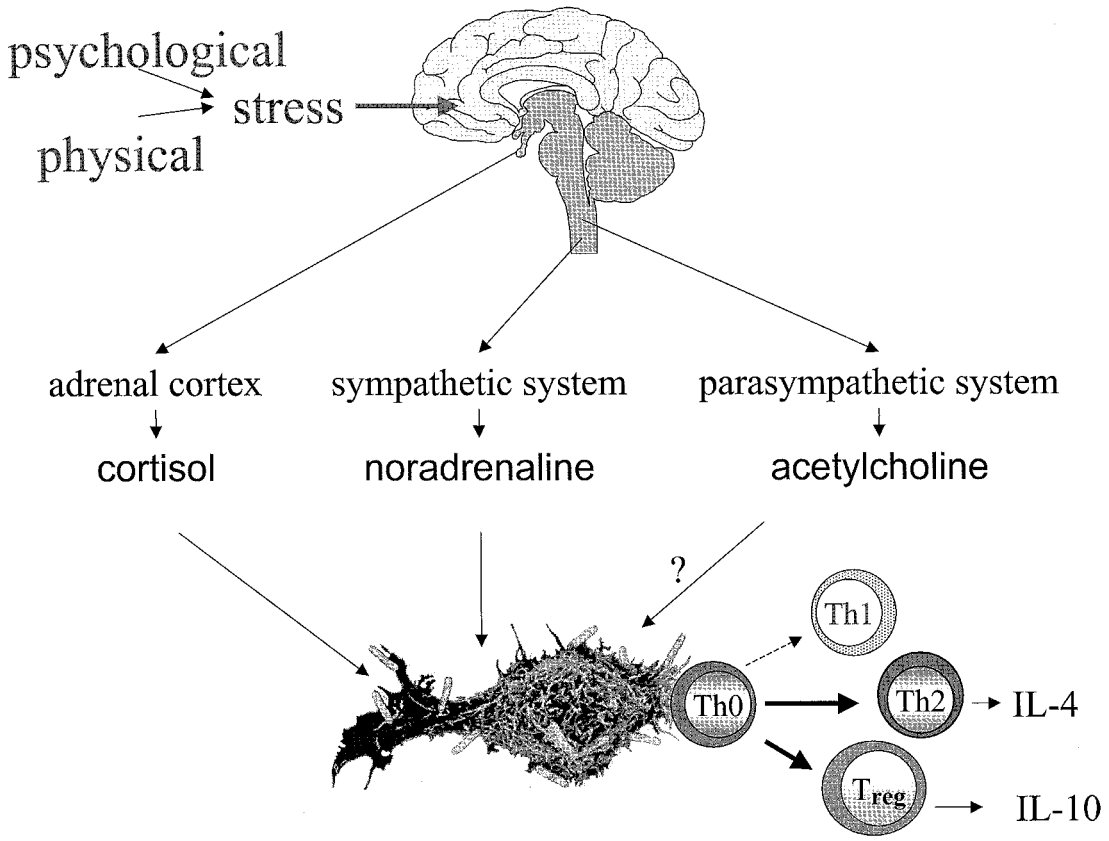
- exploitation of *beneficial effects* of microbial components in clinical trials, for treating "diseases of immunodysregulation"
  - allergic disorders (mycobacteria, lactobacilli, CpG motifs)
  - autoimmune diseases (mycobacteria)
  - inflammatory bowel disease (helminths, mycobacteria)

- ? unintentional exploitation of *detrimental effects* of microbial components ? Gulf war vaccination schedules

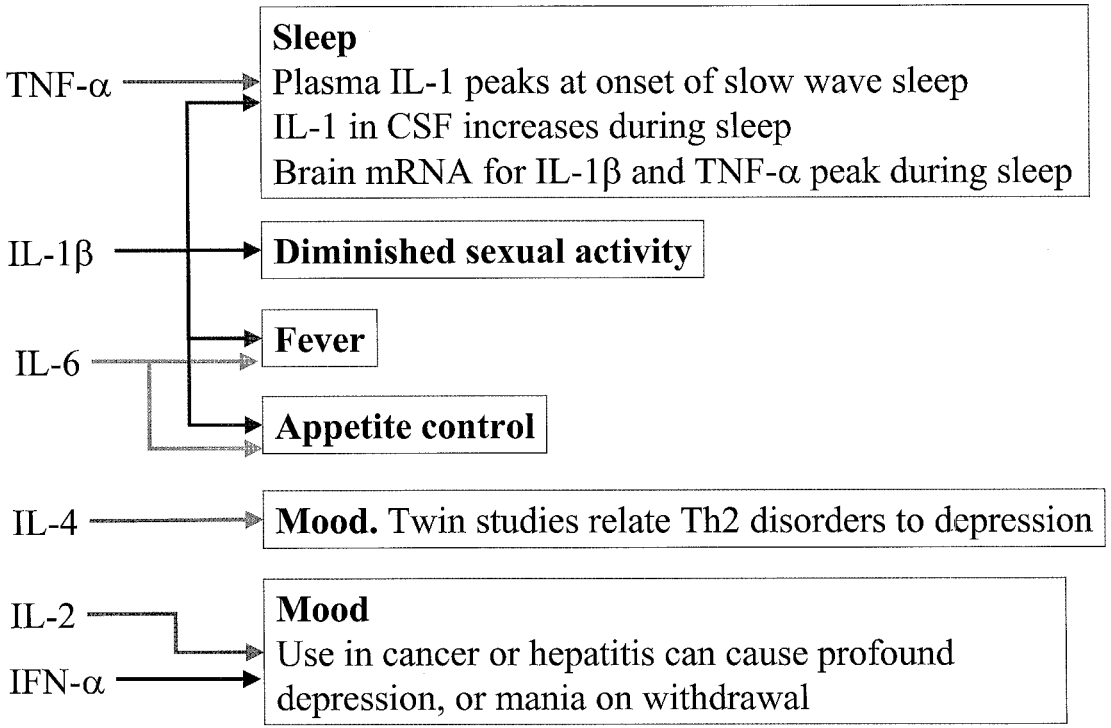
Routine vaccinations and child survival: follow up study in Guinea-Bissau, West Africa

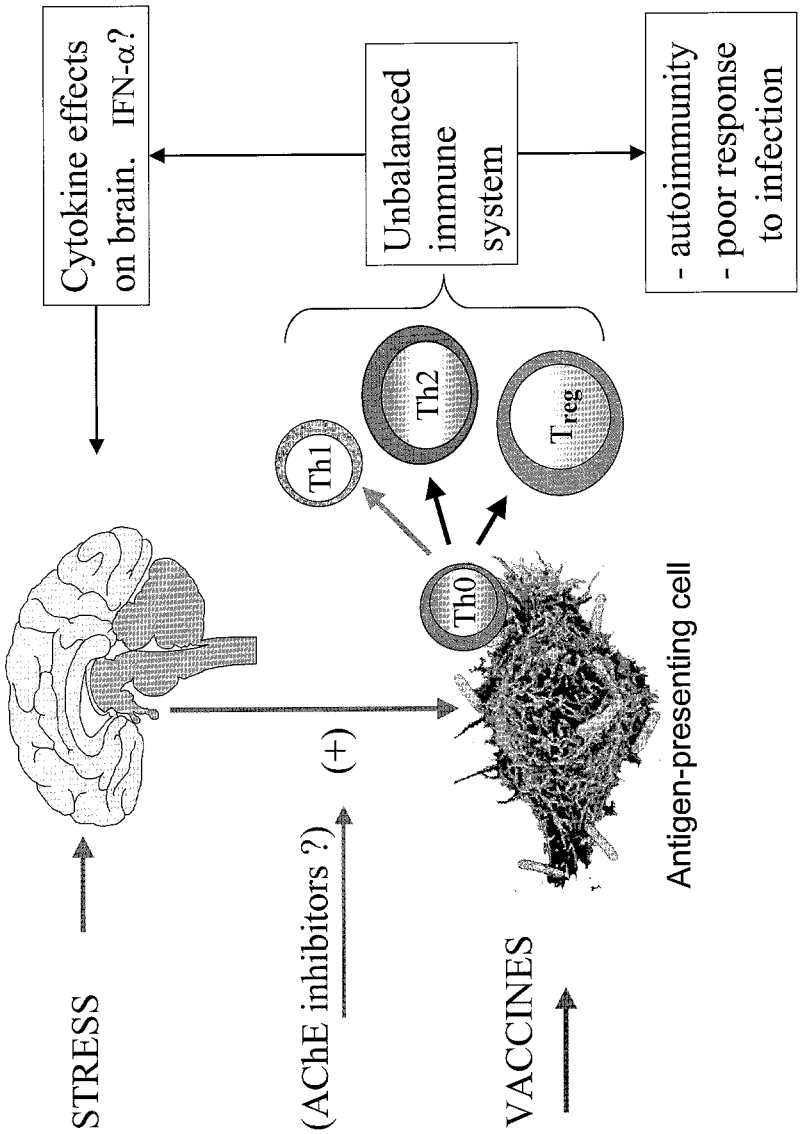
BMJ (2000) 321:1-8




psychological
physical
stress
adrenal cortex
sympathetic system
parasympathetic system
cortisol
noradrenaline
acetylcholine
?
Th1
Th0
Th2
IL-4
Treg
IL-10

Cytokines modulate "sickness behaviour" and mood




Cytokine effects on brain. IFN-α?
Unbalanced immune system
- autoimmunity
- poor response to infection
Th1
Th2
Treg
Th0
Antigen-presenting cell
STRESS
(AChE inhibitors ?)
(+)
VACCINES

Mr. SHAYS. Give me a sense of how many more slides you have.
Dr. ROOK. Maybe two. I think it is two.
Mr. SHAYS. Well, you can have three slides.
Dr. ROOK. It is only two.
Mr. SHAYS. Take your time.
Dr. ROOK. This is the question of how could changes in cytokines affect mood. There are a number which cause sickness behavior: Sleep, diminished sexual activity, fever, appetite control. They are not fanciful animal experiments, they are certain now. If you give them to cancer patients or patients with hepatitis or immunological mediators you get profound depression. Goats get depressed but become manic upon withdrawal of the material. Similarly, it is now clear that twin studies relate Th2 disorders to depression. We can see that from studies coming out of Denver.

So, the balance of the immune system affects moods in some extremely subtle ways and I come to my summary slide which puts all of this together. Over on the left there we have some of the influences to which the Gulf War veterans were exposed: Extreme stress, AChE inhibitors and vaccines. The evidence to suggest that the effect would have been to take them away from Th1 and towards an unbalanced response with too many regulatory cells, the evidence there is extremely powerful.

The next result will be an unbalanced immune system. It is exactly what has been found by Dr. Peakman's study and one would expect such things as poor response to infection and rather subtle effects on mood. That is all I want to say.

Mr. SHAYS. Thank you very much. Two very, very interesting presentations.

STATEMENT OF GORAN JAMAL

Dr. JAMAL. Thank you, Mr. Chairman and honorable members. I am absolutely delighted to be here, again to give evidence. I am going to talk about the nervous system and why it seems to be the target area in the Gulf War veterans. This is the nervous system-I will come to them, the nature of the symptoms actually reflects on each internal organ, kidney, liver, you mention it. So, the apparent multi-symptom is really not a multi-symptom at all. It is a reflection.

This was the original study, which was multi-factorial. It is not one factor it is a cocktail of a lot of factors. The organic system has many patterns. It involves all the internal organs. It is very illusive to clinical examination. That is easily overlooked. The assessment is easily overlooked. Everybody knows that, but also the symptoms of the system is extremely incapacitating with the patient and it is not measurable by any standard of clinical protocol.

We have looked into this system by looking at about 13 different approaches. Most people use one or two, we use 13 to cover most of the aspects because it is a multi system organ and this is the frequency of the abnormalities we found in the Gulf War veterans.

Again, if you look at the profile and pattern of this, there are 13 different examinations and this is the frequency, 60 persons and if you take 80 persons they produce exactly identical profiles. That profile has been compared with the chronic organophosphate one where we found similarities but not identical. It was the different profiles you could see despite the similarity of the symptoms but when you look at the different components of the system they are not similar.

This slide shows we have three patients. It is not Motor Neurons Disease but in these patients we found both brain stems and pharmacological involvement. Here is the guy telling me they have not had anything similar to that in that department at all. 'This was not similar to anything. We have not been able to carry this through, we don't have funding.' This is about £5,000 each. We have proposals for the research. I think I will stop there except to say one important thing:

I have one other side to this one. This is a slide which shows pharmacological works. We publish on organophosphates and this was funded by the government. This is one example. If you look at the red dots, the red diamonds versus the blue, the red ones are those with acute poisoning and we followed them up while the blue ones are those with no acute poisoning just continuing long-term effect. There are farmers and the black ones are the control. You see the departure between the acute, the chronic and the others but these were just some slides.

We looked at more than 600 farmers in a cross-sectional epidemiological study following this particular study and we have demonstrated in that population that the incidence of disease were normal farmers with illness. They were cross-sectional of farmers in the North of England and Scotland. In the North East it was 18 percent in this normal population compared with 0.5 percent in the phosphates—

[Alarm bells ring.]

Mr. SHAYS. Could you make the last point you were making when the bells came on?

Dr. JAMAL. I think the point I am trying to make is when we looked at a normal population cross-section of the entire farming population in Scotland and North East England, the study was more than 600 farmers with neurological symptoms and then we took a section of them for more toxic examination, we found a normal healthy-looking population but they were just farmers. We found the incidence of neuropodia was 18 percent in this population versus a normal incidence of neuropodia in the general population of 0.2 to 0.5.

Mr. SANDERS. Normal healthy-looking farmers are being poisoned, is that what you are saying?

Dr. JAMAL. Yes. Just to summarize what I am saying, what I mean in a nutshell, in summary, if the nervous system—the nervous system is a different component including the central nervous system the brain cells and seems to be primarily involved in the Gulf War syndrome and there are perfectly reasonable explanations as to why and what the patterns are and how the injury has happened to the nervous system.

The other thing is that what looks to people as apparently multi-system involvement might not really be a multi-system involvement although there is more than one factor culminating in the production of the injury.

Mr. SHAYS. Thank you, excellent presentation as well. Dr. Mackness, are you next? I am going to ask you to talk to Ross Perot and we might hear you better through the microphone.

STATEMENT OF MIKE MACKNESS

Dr. MACKNESS. I would like to thank the Committee for this opportunity to speak to you. I work primarily on an enzyme called paraoxonase which occurs in human plasma and serum and we have heard a lot today about organophosphates and this enzyme is the link perhaps between organophosphates and illness.

If I could just summarize the worldwide use of organophosphates, they are used for many things: insecticides, plasticizer, fire retardants nerve gases and in some cases medicines. Of 7.5m kg of organophosphates, just three types of organophosphates are used annually in the US alone, not wordwide, this is just the US. Worldwide production is estimated at 150m kg/year and deaths about 200,000 a year from organophosphates poisoning in agricultural use.

[The statement of Dr. Mackness follows:]

PARAOXONASE AND GULF WAR SYNDROME

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INTRODUCTION

Organophosphorus compounds (OP's) are widely used as pesticides and unfortunately in some cases as nerve gases. OP's are commonly associated with pesticide-related toxicity resulting in approximately 220,000 deaths annually world-wide [**1,2**]. These compounds exert their toxic effects by inhibiting acetylcholine esterase and life-threatening effects are observed as a result of the subsequent accumulation of acetylcholine at nerve synapses and neuromuscular junctions [**3,4**].

Serum paraoxonase (PON1) is an enzyme which hydrolyses OP's, a reaction which is dependent on Ca^{2+} ions [**4**]. PON1 is responsible for the lower toxicity of OP's to mammals compared to birds which do not have the serum enzyme [**5**]. PON1 has been shown to specifically detoxify a number of OP's such as paraoxon and chlorpyrifos-oxon while its location on high density lipoprotein (HDL) also allows it to interact and hydrolyse lipid peroxides formed during the oxidation of low density lipoprotein (LDL) [**6-8**]. Studies using PON1 knock-out mice have shown that PON1 plays a vital role in the *in vivo* detoxification of OP's [**9**] although the protection by PON1 is dependent on the OP used [**10**]. The coding region of human PON1 contains two polymorphisms, one effecting the amino acid at position-192 (Q→R) and the second at position-55 (L→M) [**11,12**]. The Q192R polymorphism produces two alloenzymes which differ markedly in their ability to hydrolyse OP's, thus the Q alloenzyme hydrolyses paraoxon much more slowly than the R alloenzyme, whilst exactly the reverse is the case for diazoxon [**13,14**]. The L55M polymorphism ahs a much smaller but independent effect on OP hydrolysis [**7,15**]. Recently, inter-individual variations in PON1 activity and the differences in its metabolic activity towards different OP's caused by the polymorphisms were determined to be important risk factors in susceptibility of OP poisoning. These differences among individuals seem to be closely

related to the PON1 polymorphism Q192R [**7,10,16-18**]. Further evidence for this has been provided by our recent study of farmers who use OP sheep-dip [**19**]. Those farmers who showed symptoms of OP poisoning had a greater frequency of PON1 polymorphisms coding for the least efficient hydrolysis of diazoxon, the active ingredient in the sheep-dip.

Gulf War Syndrome

Neurological symptoms in veterans of the Persian Gulf War [**20-22**] have been reported to be associated with chemical exposure to such compounds as organophosphates, DEET and pyridostigmine, but not with other putative risk factors, such as smoke from oil-well fires, combat stress, immunizations or the use of depleted uranium in weaponry, which have received much publicity [**23**]. Widespread repeated exposure to chemical agents including organophosphate (OP) pesticides and nerve gases, the insect repellent DEET and pyridostigmine occurred during the Gulf War. Nevertheless, the causes of the illness found in the Gulf War Veterans remains controversial.

Haley and co-workers have reported an association of the PON1-Q allele with symptoms in a group of 25 symptomatic Gulf War Veterans when compared to 20 non-symptomatic veterans [**24**]. These authors found that the activity of PON1-Q alloenzyme was significantly lower in symptomatic veterans than in non-symptomatic veterans.

We determined the levels of PON1 in the serum of Gulf War Veterans and compared these to those found in a control population. Gulf War Veterans (n=152) from the UK, who self-reported the presence of Gulf War Syndrome via a questionnaire, and 152 age and gender matched controls were studied. PON1 activity, concentration and genotype were determined (Table 1). In the Gulf War Veterans, paraoxon hydrolysis was less than 50% of that found in

the controls [100.3 (14.8-233.8) vs 214.6 (50.3-516.2)nmol/min/ml, P<0.001]. This low activity was independent of the effect of PON1-55 or -192 genotype. The serum PON1 concentration was also lower in the Gulf War Veterans [75.7 (18.1-351.3) vs 88.2 (34.5-527.4)μg/ml, P<0.00025], which was again independent of PON1 genotype. There was no difference in the rate of diazoxon hydrolysis between groups (10.2±4.1μmol/min/ml, vs 9.86±4.4, P=NS). The allele frequencies of the PON1-55 and -192 genotypes were not significantly different between the two groups. The reason(s) for the low activity in the Gulf War Veterans is unclear, however, a decreased capacity to detoxify OP insecticides resulting from low serum PON1 activity may have contributed to the development of Gulf War Syndrome **[25]**.

Table 1 – Demographic Details and Paraoxonase Parameters in Gulf War Veterans and Controls. Figures are mean ±SD except $^{+}$ which are median (range) ** significantly different from Control P<0.0001

	CONTROLS	GULF VETERANS
Number (Male/Female)	152 (145/7)	152 (145/7)
Age (Years)	42.3±12.9	37.0±8.7**
Paraoxon hydrolysis^{+} (nmol/min/ml)	214.6 (50.3-516.2)	100.8** (14.8-283.8)
Diazoxon hydrolysis (μmol/mim/ml)	9.86±4.4	10.2±4.1
PON1 concentration (μg/ml)	88.2 (34.5-527.4)	75.7** (18.1-351.3)
Paraoxonase-192 gene frequency (Q/R)	0.75/0.25	0.69/0.31
Paraoxonase-55 gene frequency (L/M)	0.63/0.37	0.62/0.38

The neurological symptoms reported for Gulf War veterans are very similar to those reported for degenerative diseases of the basal ganglia of the brain such as Huntington's and Wilson's disease [**26**]. Repetitive low-level exposure to organophosphates has been shown to affect the metabolic processes of the basal ganglia [**27,28**]. It is therefore entirely possible, that deficiency of PON1 activity in Gulf War veterans has predisposed susceptible veterans to alterations in brain biochemistry leading to classical symptoms of Gulf War Syndrome in which brain metabolic abnormalities have been reported [**29**].

Brief Discussion

We are currently seeking to confirm our observations in 2 further groups of Gulf War Veterans. However, our results would seem to indicate an organic component to Gulf War Syndrome, where exposure (to unknown factors) during the conflict appears to have resulted in low PON1 activity. This, may have, predisposed susceptible servicemen to additional factors resulting in the symptom complex of Gulf War Syndrome.

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Mr. SANDERS. Where are you getting that number from, sir?

Dr. MACKNESS. The World Health Organization.

Mr. SHAYS. Because it has come up and we have a question: Is that because of people who have no knowledge how to use it? I am not trying to be funny.

Dr. MACKNESS. Can you define "how to use it"?

Mr. SHAYS. Among sophisticated users.

Dr. MACKNESS. That is tending to be less frequent in the industrialized world. Suicides through organophosphates are much more frequent in the non-industrialized world.

Mr. PEROT. Are the instructions with the farmers? Let's say it is made in the US, are the instructions in the language?

Dr. MACKNESS. The instructions should be in the language of the country.

Mr. PEROT. If the farmer can read.

Mr. SHAYS. I am going to ask you to talk a little louder.

Mr. SANDERS. Having started the interruptions, we are rude Americans! You mentioned suicides. We heard earlier today that some 98 British veterans committed suicide but it seems a large number. What is the connection between suicide and the organophosphates poisoning?

Dr. MACKNESS. What I meant was when people drink organophosphates to commit suicide.

Mr. SHAYS. We are going to try and get back on your target.

Dr. MACKNESS. Of course there are some instances of extreme use of organophosphates. I do not really need to go through this. I think we all know what the problem is, but the one big problem with these compounds is that you can actually make the organophosphates in your garden shed which is twenty times more toxic than cyanide gas. Some acute toxicity symptoms are rather undefined at the moment, in fact they are not defined at all. In the 1950s Norman Aldridge discovered a classification of esterases which he called A-esterases which detoxify organophosphates. This distinguishes from the B-esterases which are inhibited by organophosphates. They inhibit the nervous system and prevent nerve transmission.

Work on paraoxonase began in the 1960s by a gentleman called Russell Main in the States. He actually injected partially purified paraoxonase into rats and showed that it reduced the toxicity of organophosphates. If you compare the thickness into four divisions for mammals and birds you can see the birds are more susceptible to organophosphates poisoning and that is because they have no paraoxonase. Further evidence from GCLA, if you actually knock out paraoxonase gene in mice they are extremely susceptible to organophosphates. So, all the evidence is that serum paraoxonase is extremely important in mammalian metabolism of organophosphates.

This is a background about the enzyme, this is the important property of the enzyme for humans. It actually has what are called polymorphisms. They are in the coding region of the protein, position 55 and 192. They are only found in humans and it means genetically you can inherit four or a combination of four possible isotopes of the enzyme. They all differ in their speed of hydrolysis of any given substrate but they also differ in what substrates they are more active to.

So, if we simply take the 192 and the Q is more active to diazoxon sarin and soman there is no difference in activity with phenylacetate, chloropyrifos oxon and 2-naphthyl acetate, but the R form is more active with paraoxon, methyl paraoxon, chlorthion oxon, EPN oxon and armine. So, not only do you have those forms that differ in the rate of say, diazoxon, they are actually coming the opposite way round. So, the question that we were asking, myself and my wife have done a lot of this work, is what is the role of PON in OP toxicity in man?

So, we hypothesized that different PON isoforms may be important in determining OP toxicity. These are the different isoforms. The red one is the LL and this is hydrolysis of paraoxon and you can see that is far more active towards paraoxons and the MM/QQ is far less. So, this illustrates the difference in rates of hydraolyses you can get in the different isoforms.

We have actually conducted a study of sheep farmers who had done dipping. Some had become ill and some had not. That is cases in red, the ones that were ill, reference in yellow of those who were not and basically if you look at the right-hand three columns, these show there is an increased frequency for these particular increased isoforms. These particular isoforms happen to be the ones least able to hydrolyse the active component of sheep dip used in the UK which is diazoxon. In fact, the odds of you actually having symptoms of organophosphates poisoning were 2.4 times greater in the lower print out, in other words the least effective your ability to get rid of paraoxon, the more likely you were to have symptoms of organophosphate poisoning.

That said, we conducted a study with the Gulf War veterans where we actually looked at paraoxonase in Gulf War veterans compared to healthy controls. It is the two top panels you want to be looking at here. You can see the veterans and I apologize for the abbreviation of 'vets', have much less ability to absorb and they also have a very much lower paraoxon concentration. That means independent of any of the isoforms no matter what isoform they have, they have lower paraoxonase activity.

Again, it does not matter what isoform they have, they have lower concentration. So this is in an effect that is independent of any of the generic effects on—

Mr. SHAYS. That is on all veterans, general?

Dr. MACKNESS. Yes.

Mr. SHAYS. Not just sick veterans?

Dr. MACKNESS. No, all veterans. This just shows you that the PON 1 allele were not fit for distribution between the two. So you have an independent genetic list. This illustrates that in that.

In summary, low paraoxonase in Gulf War veterans does require much further investigation as it may be involved in the aetiology of the Gulf War syndrome complex. If you want me to put that into context, low paraoxonase activity is associated with cardiovascular disease, particularly in diabetes. People who are prone to the development of diabetes tend to all have low paraoxonase activity. So, there is a link between actually having low paraoxonase activity and development of some major diseases. Thank you.

Mr. SHAYS. Thank you. We will go to you, Dr. Busby and we can go up front. Dr. Busby, I think you are our last speaker and then we will proceed with the questions.

Dr. BUSBY. Thank you very much, all of you, for inviting me here to talk about what is effectively an effect of the Gulf War low dose radiation. I have prepared a statement here and I am sure you have copies of that and I am not going to just read it out but I hope to cover the major issues.

In the last five years there has been increasing understanding that there is something very wrong, risks associated with estimating the health consequences of exposure to the low dose radiation, in particular internal radiation. By internal radiation I mean radiation inhaled or ingested, particularly man-made isotopes or new forms of natural isotopes and uranium. Uranium is one example of this. As a result of this and persuasive evidence, there is a problem in the understanding of these health effects, the British Government has now set up a committee called Cherry, examining the risks from radiation.

This is a major step and implies the British government is sufficiently concerned about the issue to investigate it. It covers a very wide area and exposure to places like Sellafield and the nuclear industry and this has been a discussion that has been around for a very long time, during the Cold War and atomic weapon testing in the 1960s which was banned, as you may recall, in 1963.

Well, I am on this Committee and I was actually responsible for the acronym, I suppose you would say that led to this being set up but the European parliament is also asking for similar investigations and the well-known organization called Kyoto also did so because I believe that the question of DU, the question of Gulf War syndrome, where we have the problem is consequent upon exposure to the uranium. Of course, there are other agents that are involved in Gulf War syndrome and if I had to choose between the various syndromes that there were and trying to lay the cause of it in some place, I would say the neurological syndromes were probably consequences of chemical poisoning but there are a whole range of effects associated with mutation and I think a lot of these effects are caused by the exposure to the radioactive particle produced when uranium weapons hit the target.

The uranium, as you know is a very dense material that is used because it enables tanks to be taken out, but when it is, the armor turns into very small microns of uranium oxide particles and they are very active and very mobile and very long lived in the environment. Also, in sunny weather they can be suspended.

I visited Iraq and Kosovo with measuring equipment and I have been able to go in both those places some years after the war and there is a considerable amount of uranium activity in particles. So, the idea that these particles somehow magically dissipate after the war and are not harmful is quite wrong. I could have brought you particles and shown you.

So, the main danger from internal radiation, the health effects of radiation have been traditionally tests on external radiation, external acute radiation from Hiroshima so people standing outside at the time of the Hiroshima bombing, there was an enormous flash and they would receive a large dose and in terms of cancer in these people they have decided through international commissions on radiology that these low dose cases are reasonably safe and on this basis the routine reports like

by Sellafield which is the nuclear site in the UK, have been discounted. In other words, the radiation or the cancer is because the dose is too low but it is only the external dose that is considered.

The internal dose from the particles ingested or inhaled is dealt with as if it were an external dose. It is diluted into the whole body and this is essentially the problem with the radiation logical assessment and why it is in error. Recently we were able to show, my colleague and I, as a result of an investigation of infant leukaemia following Chernobyl and particles following Chernobyl, they were measured between 100 fold and 1,000 fold and some Israeli people have also looked at genetic mutation in the offspring of Chernobyl and come to similar conclusions.

There is a very large error in the assessment of the risk from internal radiation. A good way to show this to you, it is rather like assuming the same from sitting in front of a fire to warm yourself or reaching into the fire and eating a hot coal. It is exactly the same dose, the amount of energy is the same. In the case of uranium also you have very, very large quantities.

Now, 350,000 tons of uranium was dropped on Iraq and when I went there I could measure a lot of the environment in relation to cancer and, of course, the particles there are still air borne in the atmosphere and going into the system and from there they take a very high dose of the tissue resulting in lymphoma and leukaemia and any other cancer or mutation. There is an increase in genetic mutation and inheritable genetic damage so you get children born with inheritable conditions and, of course, it continues on.

What evidence is there of these effects? One of the pieces of evidence is the Gulf War syndrome but leaving that aside, very recently there is a study of the Italian Military stationed in Bosnia and Kosovo. This is one of the first pieces of evidence. The data shows eight-fold increase in lymphoma after their period of duty there from Sarajevo. There has been 20-fold increase in leukaemia and lymphoma. Other evidence was from the Iraqi cancer register which you may not believe but I have been there and looked at the figure and it does seem to show the children born around the time of the Iraq war have a high incidence of leukaemia.

There is also chromosome damage, 13 Gulf War soldiers showing chromosome damage which you can approximate equal to the sort of damage the Russians measured on the Chernobyl liquidator at the time. Basically, I suppose what I am saying is that there is now sufficient evidence to suggest that the uranium is causing the genetic mutation which will result in increasing cancer and genetic damage.

Is the material measurable in people? Well, actually it is. A number of studies have shown that Gulf War veterans contain significant high levels of uranium as estimated by isotonic radiation and very recently, only yesterday I learnt of a test done in this country of 11 Gulf War veterans in which all of them were shown to have significantly increased levels of date of loss in their urine but two of them had highly increased levels of enriched uranium and this raised lots of interesting questions about enriched uranium.

When I was in Iraq I was taken to an area which was extremely radioactive. There was yellow material on the ground. I tried to bring samples back but they took them away. It seemed there was some deployment of crude radio-active weapons from the Iraqis or an attack on some facility there but it was extremely radioactive there. So we do have a lot of evidence that first of all it is out there in the environment. Secondly, it is there in the people. Thirdly, that concentration of uranium on the people can cause cancer because there are those areas of errors in the radiological risk. Fourthly, I believe the authorities do not want to open up the reasons of these effects because of the financial and political implications. Once you go into the radiological implication of what they consider to be very low radio-active material then it will raise all sorts of questions about people who are exposed for further reasons.

[The statement of Dr. Busby follows:]

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The health effects of Depleted Uranium weapons
Written evidence to the US Congressional Subcommittee on National Security
Veteran's Affairs and International Relations Hearing
London 18th June 2002

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1. My Backround

1. I have a First Class Honours degree in Physical Chemistry from the University of London and also hold a Doctorate in Chemical Physics. I was elected to the Royal Society for Chemistry in 1974 and am presently a member of the International Society for Environmental Epidemiology.
2. I am Scientific Director of the Environmental Consultants 'Green Audit'. I am scientific advisor to the Low Level Radiation Campaign. I am National Speaker on Nuclear Issues and Spokesman on Science and Technology of the Green Party of England and Wales. I am the UK representative of the European Committee on Radiation Risk based in Brussels and act as consultant on radiation and health to the Green Group/ EFA of the European Parliament. I am presently engaged in research funded by the Irish Government into the health effects of radioactive discharges to the Irish Sea.
3. I am a founder member of the UK government Committee Examining Radiation Risks from Internal Emitters, a new group set up by the Departments of Health and DEFRA to examine the validity of the present risk models for assessing radiation.
4. I am a member of the UK Ministry Defence Oversight Committee on Depleted Uranium.
5. I have been engaged in research into the health effects of low level radiation for fourteen years and have written many scientific papers and articles on the subject. I have been researching the health effects of Depleted Uranium (DU) weapons for three years. In July 2000 I was invited by the Royal Society to give a 30-minute expert presentation to their Committee on the Health Effects of DU. Six months later I was asked again by the Royal Society to give a second presentation on the health effects of DU and to discuss my scientific position with a number of invited scientists. It was partly as a result of my arguments that the Royal Society recommended the re-examination off the lymphatic doses from DU
6. In September 2000 I visited the southern battlefield areas of Iraq and toured hospitals. I examined the levels of radioactivity and made measurements using a scintillation counter capable of detecting and distinguishing alpha and beta radiation. I also examined Iraqi data on DU levels and I visited hospitals in Baghdad and Basrah, interviewed cancer physicians, epidemiologists and patients (through an interpreter). I examined official Iraqi health data. I was the guest of the Iraqi Government but funded by a TV company who made a documentary. Upon return to England I was able to make ecological correlations between levels of alpha activity and incidence of cancer in adults and children as recorded by the Iraqi cancer registry. In addition I was able to show that the cohort of children who were exposed at or around birth showed the anomalously increased levels of leukemia in the age range 5-9. This age range is unusual for childhood leukemia which normally peaks in the age group 0-4, suggesting that this cohort was exposed to some leukemia causing agent at or around birth.
7. In January 2001 I visited western Kosovo and made measurements of radioactivity and DU concentrations in a number of locations where NATO maps had indicated that DU had been fired. I collected samples and air filters. The filters have not been analysed yet but some of the dust samples taken from the street showed high levels of DU measured as Uranium-238, Protoactinium-234, Thorium-234 and Uranium 234. Highest readings were for the beta emitting daughters, Th-234 and Pa-234, and the isotope ratios suggested that the DU was removing itself from the dust by resuspension in the air.

2. Properties of DU

Depleted Uranium is a by product of the nuclear industry where the fissile isotope U-235 in natural Uranium ore is concentrated to produce reactor fuel consisting of 'enriched Uranium'. The isotope discarded by this process is Uranium 238 which is generally classed by the risk agencies as a low radiation hazard material owing to its long half life (4.47×10^9 years) and its weak gamma emission of 48keV. However, it is an alpha emitter and thus poses an ingestion risk owing to the high ionization density of alpha tracks and their high biological effectiveness in inducing mutation. In addition, there is a major risk from the beta-emitting daughter isotopes Thorium234 (beta, 0.26MeV, half life 24 days) and Protoactinium-234 (beta; 0.23MeV, half life 6.75 hours) which decay through one another to Uranium-234, also an alpha emitter with a half life of 2.47×10^5 years. The overall activity of Uranium 238 therefore increases as soon as it is produced due to ingrowth of the beta daughters and by 30 weeks these are in total secular equilibrium. The activities per kilogram are given in Table 1 below.

Weeks	**U-238** (α,γ)	**Th-234** (β)	**Pa-234** (β)	**U-234** (α,γ)
0	12.43	0	0	0
5	12.43	7.89	7.84	0.001
10	12.43	10.77	10.75	0.004
20	12.43	12.21	12.21	0.01
30	12.43	12.4	12.4	0.017

Table 1. Increasing specific activity (MBq/kg) of DU due to ingrowth of daughters.

Over centuries, the specific activity of U-234 should be the same as that of the parent U-238, and thus the environmental concentrations of these isotopes is generally the same if the source is natural. The specific total activity is thus about 37MBq/Kg. It should be pointed out that DU material recently found in battlefields in Europe contains small quantities of isotopes of Plutonium, Neptunium and other fission products: thus the source of this DU is refinement of nuclear reactor waste. However, the quantities are very small and are not considered by the authorities to be of serious radiological significance.

Owing to the high density of Uranium, ($19 g.cm^{-3}$ metal and $10.96 g.cm^{-3}$ for the dioxide) and the fact that the metal is pyrophoric (burns in air) the substance is used in the manufacture of armour piercing shells, missile nose cones and penetrators and certain ballast materials in some aircraft (e.g. helicopter rotors, commercial aircraft counterweights). A single Abrams 120mm tank shell contains about 3kg of DU (111MBq of radioactivity) and there is 275g in a 30mm GAU3A A-10 Thunderbolt Gatling Gun round.

The military penetrators explode on impact with hard targets with up to 80% conversion to micron diameter Uranium Oxide particles of a 'ceramic' nature. These particles are highly mobile and extremely long lived in the environment, owing to the very high degree of insolubility of Uranium Oxides UO_2 and U_3O_8. They can be inhaled and the sub-micron diameter particles are translocated from the lung to the lymphatic system, building up in the

tracheobronchial lymph nodes and potentially able to circulate everywhere in the body. Alpha and beta disintegrations from these particles cause very high and repetitive doses to cells local to the range of the disintegration i.e. about 30microns for the alpha and 450 microns for the beta tracks.

3. Errors in the ICRP low level radiation risk model

The model used by the risk agencies and the military to predict the health consequences of such exposure is that of the ICRP and is based on the cancer yield of the Hiroshima bomb. The group of survivors of this single large acute irradiation exposure (in which many people were killed) have been collected into the Life Span Study or LSS and their cancer rates have been compared with controls from the same town who were shielded or outside the town at the time of the bomb. The cancer yield in this LSS cohort has been used as a basis for predicting cancer risk and other health detriments for all types of radiation exposure. It has been assumed that the relationship between dose and cancer yield is linear and so low levels of exposure have been assumed to carry no significant risk on this basis.

This approach has been criticized extensively, and considerable evidence has become available in the last twenty years to suggest that the increases in cancer and leukemia near nuuclear sites are examples of a failure of the model to adequately address risk from internal radiation. However these arguments have always been countered by the risk agencies on the basis that other possible causes for the observed phenomena exist. However, very recently, two unequivocal pieces of evidence have defined errors of between 100 and 2000-fold in the ICRP risk models as applied to internal radiation risk. This evidence has forced the UK government to set up a new committee to examine the situation and assess the failures of the ICRP risk model applied to internal radiation exposure [CERRIE, 2001]. In addition, the European Parliament has called for a similar process to be undertaken by the European Commission [EU,2001], and the recent WHO conference on Chernobyl in Kiev in 2001 came to a similar conclusion [WHO 2001].

3.1 The Chernobyl Infants

Following the Chernobyl accident in 1986, in five different countries, the cohort of children who were exposed in their mother's womb to radioisotopes from the releases suffered an excess risk of developing leukemia in their first year of life. This 'infant leukemia' cohort effect was first reported in Scotland [Gibson et al, 1988], and then in Greece [Petridou et al, 1996], in the United States [Mangano, 1997] and in Germany [Michaelis, et al. 1997]. We first reported increases in childhood leukemia in Wales and Scotland following the Chernobyl accident in 1996 [Bramhall, 1996] but more recently examined the specific infant leukemia cohort in Wales and Scotland [Busby and Scott Cato 2000].

Unlike the earlier researchers, who merely showed the existence of a significant rise in infant leukemia, we decided to examine the relationship between the observed numbers of cases and those predicted by the present radiation risk model. This was an invaluable opportunity since the specificity of the cohort enabled us to argue that the effect could only be a consequence of the exposure to the Chernobyl fallout. There could be no alternative explanation, like the 'population mixing hypothesis' advanced to explain away the Sellafield childhood leukemia cluster. However implausible such theories may be, they have acquired popularity, and their proponents status, as a consequence of their utility to the nuclear lobby. However, population mixing may not occur at Sellafield but it cannot occur in the womb.

Because the National Radiological Protection Board had measured and assessed the doses to the populations of Wales and Scotland and because they themselves had also published risk factors for radiogenic leukemia based on ICRP models it was a simple matter to compare their predictions with the observations and test the contemporary risk model. The method simply assumed that infants born in the periods 1980-85 and 1990-92 were unexposed, and defined the Poisson expectation of numbers of infant leukemia cases in the children who were *in utero* over the 18 month period following the Chernobyl fallout. This 18 month period was chosen because it was shown that the *in utero* dose was due to radioactive isotopes which were ingested or inhaled by the mothers and that whole-body monitoring had shown that this material remained in the bodies of the mothers until Spring 1987 because silage cut in the Summer of 1986 had been stored and fed to the cattle in the following winter. The result was startling. First, there was a statistically significant 3.8-fold excess of infant leukemia in the combined Wales and Scotland cohort ($p = 0.0002$). Second, the leukemia yield in the exposed 'in utero' cohort was about 100 times the yield predicted by the model. In passing it should be noted that this number, 100, is very close to the error required to explain the Sellafield childhood leukemia cluster.

It should be noted that the possibility of the effect being due to chance may be obtained by multiplying the p-values for the null hypothesis that the effect was due to chance in each of the separate countries and studies to give an overall p-value less than 0.0000000001. Thus it was not a chance occurrence: it was a consequence of the exposure to low-level radiation from Chernobyl.

And since the World Health Organization has given approximate exposure levels in Greece, Germany and the United States, it was also possible to examine the leukemia yield in the infant 'exposed cohort' reported by the several other studies and establish a dose response relationship. This dose response is biphasic and not linear which supports models of radiation action involving damage to sensitive sub classes of cells [Busby 2000] or cell domains [Burlakova, 2000].

3.2 Minisatellite DNA in Chernobyl children

Since the discovery of the DNA minisatellite characterisation method, 'DNA testing' it has been increasingly applied to those who were exposed to the fallout from the Chernobyl accident. In a series of papers, Dubrova et al. showed an association between exposure of children in Belarus [Dubrova et al.1997] found a doubling in the mutation rate in children from the high exposure territories of Belarus compared with controls from low exposure territories. This discovery was astonishing to those who adhered to the ICRP risk model for genetic mutation since this was based on the belief that the Hiroshima exposures, which were hundreds of times higher than the average dose in Belarus, had produced no genetic effect on any offspring of those exposed. A doubling of the mutation rate thus pointed to an error of some 1×10^5 . Others pointed out that even if the minisatellite DNA was mutated, this was not an effect which had any significance since there were no phenotypical changes associated with minisatellite DNA. Shortly after this, it was reported that barn swallows which migrated to Belarus had similar changes in their minisatellite DNA and these were assocated with plumage pattern alterations which destroyed their camouflage and thus might be harmful. [Ellegren et al. 1997]

The question of proper controls and the reality of the effect was answered very recently in an elegant study by Weinberg et al.[2001]. They examined minisatellite DNA changes at various loci in the offspring of the Chernobyl 'liquidators' who were born after the accident and compared their DNA to their siblings born before the accident. Results showed that there was a significant difference of up to seven-fold. The dose response relationship appeared to be biphasic. Based on the natural mutation rate in the minisatellite DNA, the

finding showed an error in the ICRP risk factor for mutation of between and 700-2000 fold. This series of studies thus demonstrates finally and unequivocally that the ICRP risk model for internal exposure is in error by up to three orders of magnitude.

4. Radiation Risk and Scientific Method

I must ask how it is that some fifty years after the atom bomb, and following a huge amount of research into the subject, we can have discovered such a huge error in the science of radiation risk. To understand the answer, we must look at the scientific method a little more closely.

The classical exposition of the scientific, or inductive method (originally due to William of Occam) is what is now called Mill's Canons, the two most important of which are:

- The *Canon of Agreement* which states that whatever there is in common between the antecedent conditions of a phenomenon can be supposed to be the cause, or related to the cause, of the phenomenon.
- The *Canon of Difference* which states that the differences in the conditions under which an effect occurs and those under which it does not must be the cause or related to the cause of that effect.

In addition, the method relies upon the *Principle of Accumulation* which states that scientific knowledge grows additively by the discovery of independent laws, and the *Principle of Instance Confirmation*, that the degree of belief in the truth of a law is proportional to the number of favourable instances of the law.

Finally to the methods of inductive reasoning we should add considerations of *plausibility of mechanism.*

These are the basic methods of science [Mill, 1879; Harre, 1985; Papineau, 1996]

Let us first define our question. It is this. What are the health consequences of exposure to novel internal radioisotopes at whole organ dose levels below 2mSv? Because we are looking at battlefield DU, we should add that in this case, although the element is 'natural', the exposure is novel, and due to internal sub-micron Uranium Oxide particles embedded in tissue.

Although risks from exposure to high levels of ionizing radiation are generally accepted, since they are fairly immediate and graphic, the situation with regard to low-level exposure is curious. There are now two mutually exclusive models describing the health consequences of exposure to low-level radiation. There is a nuclear establishment one, which is that which is presently used to set legislation on exposures and argue that DU is safe, and a radical one, which is espoused by the anti-nuclear movement and its associated scientists.

The two models arise from two different scientific methods. The conventional model is a physics-based one because it was developed by physicists prior to the discovery of DNA. Like all such models it is mathematical, reductionist and simplistic, but because of this is of great descriptive utility. Its quantities, dose, are average energy per unit volume or dE/dV and in its application, the volumes used are greater than 1kg. Thus it would not distinguish between the average energy transferred to a person warming themselves in front of a fire and a person eating a red-hot coal. In its application to the problem at hand, the internal, low-level, isotopic or particulate exposure, it has been used entirely deductively. The basis of this application is that the cancer and leukemia yield has been determined following the external acute high-dose irradiation by gamma rays of a large number of Japanese inhabitants of the town of Hiroshima. Following this, arguments based on averaging have been used (quite spuriously) to maintain that there is a simple linear relationship (in the low-dose region) between dose and cancer yield. This Linear No Threshold (LNT) assumption enables easy calculations to be made of the cancer yield of any given external irradiation.

By comparison, the radical model shown in Fig.2 arises from an inductive process. There have been many observations of anomalously high levels of cancer and leukemia in populations living near nuclear sites, especially those where the measurements show that there is contamination from man-made radioisotopes, e.g. reprocessing plants. In addition, populations who have been exposed to man-made radioisotopes from global weapons tests, downwinders living near nuclear weapon test sites and those exposed to these materials because of accidents (like the Chernobyl infant leukemia cohort) or because of work in the nuclear industry or military. A review of these findings is available [Busby, 1995] and a more recent literature review of studies showing these effects if published by the Low Level Radiation Campaign [LLRC, 2000]. In addition, the radical model is based on biological considerations and considers each type of exposure according to its cellular radiation track structure in space and in time. It is not, therefore, possible to employ this model to predict risks from 'radiation dose' to 'populations' but only from microscopically described doses from specific isotopes or particles whose decay fractionations are considered to interact with cells which themselves respond biologically to the insults and may be in various stages of their biological development. The dose-response relationship following from this kind of analysis might be expected to be quite complex.

These models are mutually exclusive: which one is correct? What considerations can we use to choose?

The answer is that the conventional LNT model must be rejected because it is not scientific. Its conclusions are based on deductive reasoning. It falsely uses data from one set of conditions, high-level, acute, external exposure to model low-level, chronic, internal exposure. It is scientifically bankrupt, and were it not for political considerations, would have been rejected long ago. On the other hand, it should be clear that the radical model conforms to all the requirements of the scientific method listed above. Man-made radioisotopes, often in the form of 'hot particles' are common contaminants to the areas near nuclear sites where there are cancer and leukemia clusters, and to the downwinders, and to the fallout-exposed populations. This satisfies the *Canon of Agreement*. The contingency analysis tables with control populations for such studies show that the *Canon of Difference* is also satisfied: people living in more remote regions than the downwinders show lower levels of illness. We must by now also have some faith in a *Principle of Instance Confirmation*, since so many studies have shown that increases in cancer and leukemia follow these exposure regimes at low dose. Indeed, the Gulf War Syndrome, might be considered as such an instance confirmation. We are left only with 'Plausibility of Mechanism', which will be addressed briefly below.

5. Mechanistic Considerations

Averaging Dose

I want to look more closely at the averaging model and its predictions at low dose. It is essentially what used to be called a colligative model: the dE/dM formulation of dose requires that energy transfered from absorption of the consequence of a radioactive disintegration is averaged over the target site, usually the whole body or organ. Whatever lip service is made to considerations of what is now called 'microdosimetry', close examination of calculations done to establish risk near nuclear sites shows this to be the case. The documents NRPB R-276, *Risk of Leukemia and other Cancers in Seascale from All Sources of Radiation* published in 1995 is a good example. In this document, doses to the lymphatic system were calculated by modelling it as 'liver, lung, kidney, spleen, pancreas, uterus and intestines'. A physiologist would not recognise this list as the 'lymphatic system', so why

was it used? The answer is that breathing introduces the particles of plutonium that exist in the air near Sellafield into the lungs of the children who live there. From the lungs, these particles are scavenged to the two small tracheobronchial lymph nodes which have a combined mass of perhaps one gram. If NRPB had divided dE by 1 gram, the resultant dose to this part of the lymphatic system would have been extremely high. Given that this organ has been identified as a source of lymphoma and leukemia in animals, this sounds very like the cause of the Sellafield leukemia cluster. But dilution of the plutonium decay energies into the whole mass of guts used for dM reduces the 'dose' to an acceptable small level. This process, incidentally, is very relevant to the DU exposures.

The model that is presently used to calculate internal doses is essentially that of a 'bag of water' in the shape of the whole body or organ. Of course, in the low dose region, cells are either hit or not hit, so the cell dose is very different from the tissue dose. Nevertheless, the model is valid as a means of establishing a quantity, 'dose' which can be correlated with some health consequence like cancer, so long as each cell in the body, or target region, has an equivalent probability of being hit (or more properly intercepted by a track). Dudley Goodhead has written of the low-dose region [Goodhead, 1988]:

Most situations of practical interest are characterised by cells receiving occasional single tracks well separated in time from any other tracks which may impinge on the same cell. From Natural Background, there is, on average, about one track per year through each cell nucleus. Therefore it is highly unlikely that there will be multiple tracks in short times (< 1 day) over which repair of radiation induced damage within cells is usually observed to take place.

It is these (essentially external irradiation) considerations that enable the model to assume the linear dose response relationship that is the basis for radiation risk. But there are two situations of practical interest that Goodhead's arguments do not address. The first is that a cell's response to radiation damage is not constant over its lifespan: cells are very sensitive to radiation when they are in their repair and replication cycle. The second is that for internal radionuclide decays, either from sequential emitters or from 'hot particles' the microscopic local radiation flux, or energy density, may be very high, even though the average dose may be low. For internal exposure, these are common situations. Here the concept of 'dose' no longer applies and the conventional model breaks down. I will address these in turn.

Cellular responses to radiation: the Burlakova dose response

It has been known from almost the beginning of the radiation age that rapidly replicating cells are more sensitive to radiation damage [Bergonie and Tribondeau, 1906]. Indeed, this is the basis of radiotherapy for cancer where it is the rapidly proliferating cancer cells that are preferentially destroyed. Most cells in a living organism are in a non-replication mode, sometimes labelled G0. These cells are contributing to the organism as part of the normal living process and do not need to replicate unless there is some signal requiring this, perhaps because of tissue growth, damage or senescence. Throughout the growth and lifespan of individual organisms, there is a constant need for cellular replication, and therefore there are always some small proportion of cells which will be replicating: the magnitude will naturally depend upon the type of cell. When cells receive the signal to move out of stasis or G0, they undertake a fixed sequence of DNA repair and replication, labelled G0-G1-S-G2-M, with various identifiable check points through the sequence which ends in replication M or Mitosis. The period of the repair replication sequence is about 10 to 15 hours and the sensitivity of replicating cells to damage including fixed mutation is extremely high at some points during this sequence. Although the sensitivity to mutation across the cell cycle is not accurately known, for cell killing, the results of early experiments on Chinese hamster cells indicate up to 600-fold variation in the cell radiation sensitivity over the whole cycle. [

Morton and Sinclair, 1966] If we display this response variation on a scale that shows the normal cell lifespan in the organism, rather than just over the cell cycle *in vitro,* the window of opportunity for cell mutation at high sensitivity becomes very small as a fraction of the cell lifespan. So the picture of isotropic dose to equivalent cells, the 'bag of water' phantom model outlined by Goodhead has to be reviewed. Perhaps 1 percent of these cells are actively dividing and are in repair replication sequences that we will assume, for argument, are 600 times more sensitive to being 'hit' by a track. What would we expect the dose-response to look like? Well as the dose was increased from zero, the sensitive cells would begin to be damaged and a proportion of these hits would results in fixing a mutation and increasing the possibility of cancer. As the dose increased further, eventually this rise in response would peak as these sensitive cells were killed. The mutation yield would then begin to fall. However, at some point, the insensitive G0 cells would begin to be damaged and the whole process would begin again, with a rise in cancer. Ultimately there would be a second fall, but this level of exposure would probably result in the death of the organism (although such considerations have been used to explain an observed fall-off in effect from alpha emitters at high dose). This type of response was shown to occur in several experiments by Burlakova, although she gave a different explanation for it, involving a combination of increasing damage and induced repair curves and more recently, the sensitivity of a number of cellular sub-systems whose integrity affects DNA repair and accurate replication.

The results of animal studies on beagle dogs and mice also show these biphasic effects in the low-dose region [Busby, 1995]. This type of curve is also seen in the Chernobyl infant studies.

The Second Event Theory

There is large variation in sensitivity over the cell lifespan. Although naturally dividing cells may accidentally receive a 'hit', this process can be modelled by averaging over large masses of tissue, even if the dose response curve is not linear, as thought. However, unplanned cell division, preceded by DNA repair can be forced by a sub-lethal damaging radiation track: this is one of the signals which push the cell out of G0 into the repair replication sequence. It follows that two hits, separated by about eight hours, can generate a high sensitivity cell and then hit this same cell a second time in its sensitive phase. This idea, the 'Second Event Theory' is described and supporting evidence advanced in Busby 1995 and its mathematical description has been approached slightly differently in Busby 2000. It has been the subject of some dispute by NRPB (Cox and Edwards, 2000, Busby, 2000a)

Very recently, developments in micro techniques have enabled some new evidence that supports the two hit idea to emerge. Miller et al., [1999] in a consideration of Radon exposure risks, have been able to show that the measured oncogenicity from exactly one alpha particle hit per cell is significantly lower than for a Poisson distributed mean of one alpha particle hit per cell. The authors argue that this implies that cells traversed by two alpha particles or more contribute most of the risk of mutation, i.e. single hits are not the cause of cancer.

There are two types of internal exposure for which there would be expected to be an enhancement of risk from this Second Event source. The first, due to sequentially decaying radioisotopes like Strontium-90 has been discussed in Busby 1995, Cox and Edwards, 2000 and Busby, 2000. Following an initial decay from an Sr-90 atom bound to a chromosome, the second decay from the daughter, Yttrium-90, whose half-life is 64hrs can hit the same cell in the induced replication sequence with a probability that is simple to calculate. The same dose from external radiation has a vanishingly small chance of effecting the same process. The second type of Second Event exposure, referred to in Busby 2000a, is from micron or sub-micron sized 'hot particles'. If lodged in tissue, these will decay again and again

increasing the probability of multiple hits to the same cell inside the 10 hour repair replication period. It is this process that is relevant to the Depleted Uranium problem.

Second Events from DU particles.

The US Defence Department commissioned research into the levels of Uranium Oxide particulates produced by the impact of Abrams M1A1 Tank ammunition at the Nevada test site in 1986 [USBRL 1986]. The impact on armour of Depleted uranium penetrators results in about 80% conversion to Uranium Oxides UO_2 and U_3O_8 in the form of ceramic particles of diameters in the micron region. These aerosol particles are very mobile and can clearly be inhaled. In this regard the hazard is of a similar nature to that from the Plutonium oxide particles resuspended from Sellafield discharges to the Irish Sea which were considered as a possible cause of the Sellafield leukemia cluster by COMARE and NRPB and referred to earlier where it was recorded that the ICRP66 models used to estimate doses did so by diluting the particles energy into large masses of tissue.

For particles below 1 micron diameter, self absorption of the alpha particle decays may be considered second order and the dose to tissue in the range of these alpha decays calculated. Table 2 shows the calculated doses in spheres of tissue within the 30micron range of the alpha decays. Also tabulated is the number of hits per day to this sphere of tissue. The table shows that for particles as small as 0.2 microns diameter, average annual alpha dose to the (lymphatic) tissue surrounding the particles is about the same as the total annual average background dose of 2mSv. For larger particles the dose rapidly increases. Between 0.5 and 5 microns, Second Event processes are stochastically likely.

Particle diameter	Particle vol. cm^3	Mass U_3O_8 (g)	Mass U238 (g)	Activity of particle	Hits /day (dose/day)	Hits/year (dose/year)
0.2 μ	4.2×10^{-15}	3.6×10^{-14}	3.06×10^{-14}	3.8×10^{-10} Bq	3.3×10^{-5} (3.96×10^{-3}mSv)	0.012 (1.44mSv)
0.5 μ	6.5×10^{-14}	5.6×10^{-13}	4.8×10^{-13}	5.9×10^{-9} Bq	5.1×10^{-4} (0.06mSv)	0.186 (21.9mSv)
1.0 μ	5.2×10^{-13}	4.3×10^{-12}	3.7×10^{-12}	8.8×10^{-8} Bq	7.6×10^{-3} (0.91mSv)	2.77 (332mSv)
2.0 μ	4×10^{-12}	3.5×10^{-11}	2.9×10^{-11}	3.6×10^{-7} Bq	0.031 (3.72mSv)	11.32 (1358mSv)
5.0 μ	6.5×10^{-11}	5.6×10^{-10}	4.75×10^{-10}	5.9×10^{-6} Bq	0.51 (60mSv)	186 (21900mSv)

Assumptions: Uranium Oxide (U238) is in the U3O8 form (density = 8.6); specific activity of U238 = 12.43 MBq/Kg: Alpha decay energy = 4.45MeV; Alpha range = 30 microns. Relative Biological Effectiveness factor for Alphas = 20 (from ICRP) has been used to convert dose in Grays to effective dose in Sieverts.

Table 2 Doses to sphere of tissue 30 micron radius by one particle of U_3O_8 of various diameters

For Uranium, the table shows that for particles as small as 0.2 microns diameter, average annual alpha dose to the lymphatic tissue surrounding the particles is about the same as the total average natural background dose of 2mSv. (It is, of course, additional to NBR) For larger particles the local dose rapidly increases.

Particle sizes from 0.1 to 5 microns are frequent in the environment. The dangerous size range for genetic mutation is between 0.5 and 5 microns for Uranium Oxide since "Second Event" processes will occur for particles of this size

Energy density and risk

The consequence of aggregating decays into a small sphere around a 'hot particle' is, of course, that the number of different cells capable of being hit elsewhere is necessarily reduced: we have converted a number of tracks well separated to the same number of tracks close together. If all tracks carry the same risk of mutation in cells in the track, i.e. all hits are equivalent, then there should be no hazard enhancement. The Second Event hazard enhancement proposed arises not from some 'hot coal' type of energy concentration process but from the fact that cells may be triggered into a sensitive repair replication sequence which carries a very high sensitivity weighting. However, at high doses, it is now conceded that mutation is proportional to dose squared or higher orders of dose, and under such conditions, there will be an enhancement of hazard from such an effect also. In addition, it may, of course be true that there would be other reasons why concentrated irradiation of a small cluster of cells could produce unstable cell replication or cell communication fields such as those recently proposed by Sonnenschein and Sato [1999] and this itself may lead to a tumour promotion advantage.

Beta emissions from DU

There is one further matter which may have been overlooked in the case of DU. It was pointed out that Uranium-238 is an alpha emitter but depleted Uranium is also a beta emitter: indeed in the solid form the two beta-emitting daughter isotopes, Thorium-234 (beta; 0.26MeV, 24 days) and Protoactinium-234 (beta 0.23MeV, 6,75 hrs) are in equilibrium with the parent after 20 weeks (Table 1). These beta emissions are the main radiological hazard in handling the bulk material. In Iraq, I recently measured 24,000 counts per second at the surface of a stray A-10 30mm penetrator which was just lying on the ground. This represented a dose of about 1mSv/hour to the hands of anyone holding the penetrator. However, most of the beta (and alpha) decays were absorbed inside the bulk material, and only surface disintegrations were emerging to be absorbed in the scintillation counter head.

The equilibrium beta activity of DU is about 37MBq/kg. But most of this energy is absorbed in the bulk material: oxidation of the material on impact to produce some 10^{14} 1 micron diameter Uranium Oxide spheres per kilogram would enable all of the decay energy to be potentially available for human exposure. The enhancement of efficiency in release of beta radiation is thus greater than 1000-fold.

Environmental Mobility of the DU particles

In order to be define the population at risk, it is necessary to know the fate of the Uranium particles subsequent to impact. At the Nevada test site, the atmospheric concentration at 100m from impact exceeded the UK NRPB Generalized Derived Limit for Uranium in Air by a factor of about 5 [Busby 1999]. Dietz has reviewed data which establishes that DU

particles are able to travel at least 100km from their impact source [Dietz, 1997]. I recently made measurements of alpha radiation levels in Iraq in three areas, the southern battleground near tanks destroyed by DU fire, the same area remote from the tanks, the town of Al Basrah and the city of Baghdad. Results showed that the alpha activity in the battleground area was more than five times higher than in Basrah and ten times higher that in Baghdad. In addition, and remarkably, levels on the surface of the ground near the damaged tanks did not generally show high levels of alpha or beta signal from Uranium and its daughters except in the case of one tank where a yellow contaminant, probably UO_3, showed high levels of beta activity. In addition, the insides of tank turrets which had radioactive holes in them from A10 hits, did not show high levels of beta or alpha activity. The generally higher alpha levels in the whole area, coupled with these observations suggest that the Uranium particles has been efficiently dispersed by some mechanism. I believe that this mechanism is the repulsion of charged particles by themselves and by the earths permanent electric field of 150V/m. I have argued elsewhere that this effect operates in the Kennet Valley near the Atomic Weapons plant at Aldermaston and results in the preferential concentration of charged radioative particles near electrostatic discontinuities between strata with different conductivity [Busby, 1997] . A similar effect near high voltage power lines was recently found by Henshaw et al. [1999].

Conclusions on Mechanism

Thus we can conclude that the external bag-of-water model is not an accurate representation of the kind of processes that occur at the cellular level and that the physics-based descriptions do not apply to internal irradiation. The Uranium Oxide particles are capable of travelling very large distances [Deitz, 1997]. They may then be inhaled and will become trapped in the lymphatic sytem where they may be transported to any part of the body. Here they may cause sequential moderate dose irradiation of local tissue volumes where the risk of mutation is far higher than is suggested

The enhancement of mutation efficiency that follows from exposure to inhaled Uranium oxide hot particles is capable of explaining the 'anomalous responses to low dose exposure' found near Sellafield and other nuclear sites and also 'Gulf War syndrome' etc. We are not, however, reduced to looking only at the Gulf War Syndrome and the Iraqi children for supporting evidence though I shall return to these later. There are other indicators, and our springboard for these is the 1983 observation of a childhood leukaemia cluster at Sellafield. In the last four years Green Audit been funded by the government of the Republic of Ireland to study cancer incidence close to the Irish sea. The study has used both Wales Cancer Registry and Irish Cancer Registry data to examine and explain variations in cancer risk with distance from the sea. The results of this work will be published elsewhere but since they cast considerable light on the DU problem, some of the findings will be briefly reviewed here.

6. Sea coast cancer risks and resuspended hot particles.

In three separate investigations between 1997 and 2000, Green Audit discovered profound and statistically significant evidence of excess risk of cancer incidence and mortality in coastal populations in Wales, Ireland and Somerset. The excess risk has been found for most of the cancer types and sites and in the following data:

- Incidence data for small areas in Wales from Wales Cancer Registry from 1974-89
- Incidence data for small areas of Ireland from the Irish National Cancer Registry for 1994-1996.

- Mortality data for census wards in Somerset from the Office for National Statistics for 1995-1998

In each area the trend with distance from the sea shows a sharp rise in the group of people living within 800m of the sea coast. It is driven by proximity to areas of intertidal sediment known to be contaminated with radioisotopes from Sellafield discharges. In the case of the Somerset study, which was investigated as a hypothesis test the drying, offshore, mud bank, known as the Steart Flats, was contaminated by historic releases from the adjacent Nuclear Power site at Hinkley Point.

Sufficient evidence has now accumulated from these studies to support the hypothesis that this cancer risk is a consequence of an exposure route involving inhalation of resuspended radioisotopes, particularly Plutonium Oxide particles. The trend in concentration of Plutonium with distance from the sea in Cumbria has been established by measurements made by the UK Atomic Energy Authority and this trend is very similar to the cancer trend outlined . Air concentrations of Plutonium Oxide fall off rapidly with distance from the coast and are highest inside the 1km strip in low lying areas. The radioactivity is brought inland by seaspray scavenging mechanisms which are quite well understood: indeed, the ocean is the source of about 30% of all PM10 particles in the UK. It is therefore not surprising that NRPB workers found Plutonium in the tracheobronchial lymph nodes of autopsy specimens from all over the UK in proportion to their distance from the west coast, particularly Cumbria [Popplewell, 1986]. Nor is it surprising that Plutonium is found in children's teeth in the UK at levels which reflect a similar trend with distance from the Irish Sea [Priest et al, 1996]

7. Recent evidence on DU exposure risks and response by UK government

DU, leukemia, cancer and birth defects in Iraq

There have been reports from within Iraq of serious health problems emerging after the Gulf War. These problems are apparent in the soldiers, in civilian adults living in the south near the war zone and also in children. They take the form of a range of conditions similar to those categorised as 'Gulf War Syndrome' in the US and UK veterans and also in large and significant increases in cancer and leukemia in adults and children and also birth defects including novel types of birth defect. I visited the country in September 2000 with Al-Jazeera TVand toured the hospitals in Baghdad and Basrah, speaking to senior doctors and health service researchers. Cancer registry data reflect the increases in cancer and show that the main increases are also in the parts of the country, south and north of Baghdad, where DU ammunition was mainly used. Significant pieces of evidence are the first, the geographical pattern of cancer and second the cohort effect in childhood leukemia which shows the main excess in the cohort aged 5-9 in 1998. This is an unusual finding for childhood leukemia which normally peaks in the 0-4 age group and indicates that it was the war birth cohort that showed the greatest leukemia effect. The geographical pattern of cancer also broadly correlates with the measurements I made of alpha activity in air in the country, which again reflects the distribution of DU based on the areas where the material was mainly used.

DU in Kosovo

No cancer data is available in Kosovo owing to the large changes which have been taking place there after the war. I was able to visit western Kosovo in January 2001 with Nippon TV and we used UN maps supplied by the Italian Army to locate areas where DU had been used. Using a survey scintillation counter I found areas where high beta counts indicated the presence of significant amounts of DU and took samples for analysis by alpha and gamma spectroscopy and also thermal ionisation mass spectrometry. Two main conclusions could be drawn from the results, which are shown in Table 3.

First, some 18 months after its use, significant quantities of DU either were resuspended in or remained suspended in the atmosphere to be precipitated with snow and to pool under the snow when it melted. The ratio of daughter isotopes to parent U-238 was remarkable. Instead of there being a 1:1:1 equilibrium ratio, the activity of U-238 in the sample was much smaller than the activity of the daughter isotopes. Since Uranium is largely insoluble (or would not have been there if it were soluble) this result shows that the Uranium particles had become resuspended between the time the snow melted and the time I measured the activity (about 2 weeks)

UNEP report on Kosovo

Following concerns about the possible health effects of radioactive contamination from Depleted Uranium weapons used by NATO in the actions in Kosovo in 1999, a number of scientists and experts were assembled under the auspices of the United Nations Environment Programme to visit Kosovo between 5-19th November 2000 to investigate levels of contamination and report on possible health hazards. Details of the expedition and its protocols and findings are to be found in the report [UNEP, 2001]. I have analysed their findings in a presentation to the European Parliament in Strasbourg in 2001 [Busby 2001, www.llrc.org] but will briefly outline UNEPs findings and their conclusions.

UNEP made three main claims relating to their findings.

a. There was no widespread dispersion of DU in areas of Kosovo where the shells were fired. DU measurements showed only local contamination, i.e. there was no evidence of DU further than 10-50 metres from a direct hit site.
b. There was no contamination of water sources.
c. There was no health hazard to humans anywhere with the possible exception of some slight danger from handling shell fragments for a long period.

	Sample A5	Sample A6*	Sample A5A
	Gjakove	Gjakove	Cermjan
	Surface road dust	Surface road dust	Soil
Field Beta cps at 5cms	14	27	4.5
NATO Grid Reference	DM545937	DM545937	DN534026
Number of A10 rounds	225	225	655
Date of attack (NATO)	7th June 1999	7th June 1999	7th June 1999
U238	353 (6.5)**	5443*	19.6*
U235	6.8 (1.20**	69.6*	0.86*
U234	26.1 (2.3)**	91.08 (18)*	NA
Th234	1721 (52)	4988 (98)	NA

Pa234m	1836 (98)	5352 (433)	NA
Pb214	1.7 (.2)	1.1 (.3)	NA
Bi214	1.5 (.3)	1.3 (.3)	NA
Mass Ratio U238/U235	353	504	146 or 138.4[a]
Natural Uranium Ratio	137.8	137.8	137.8
DU present	Yes	yes	Yes

*Note 1: * Uranium by Thermal Ionisation Mass Spectrometry; **Uranium by Alpha Spectrometry; all others by Gamma Spectrometry.*

Note 2: Electra with DP2 Dual Phosphor 4-inch Scintillation Counter (NE Beenham Reading) gave average background beta counts per second in the field of 3-3.4cps. This is slightly greater than average levels in the UK of about 2.7cps.

[a] 146 was the value using ammonium carbonate extraction of Uranium, 138.4 was using nitric acid extraction which dissolves all the Uranium, not just the adsorbed Uranium.

Table 3 DU dust does not harmlessly disperse in the environment. Results of tests on samples from Kosovo collected 19th 20 20th Jan 2001, more than 18 months after the attack

Examination of the tables of results shows that all three of these conclusions are incorrect and that the results showed the presence of widespread contamination by DU both by aerosol dispersion of particles greater than 0.2 micron diameter and decay products of U-238.
I conclude that the analysis of the results given in the tables was either biased or badly interpreted. Significantly, the tables of results were not attached to the report when it was sent to the Press. Consequently it was only the conclusions which were addressed at the Press conference [Parsons, 2001, Fleming, 2001]

Nic Priest's study for the BBC

Shortly after my visit, which followed UNEP's visit, in Spring of 2001, BBC Scotland commissioned Nic Priest, of Middlesex University to visit Kosovo and Bosnia and measure DU in urine samples taken from members of the population living in Eastern Kosovo in areas where bombing had occurred. I advised them to visit Djakove, where I had found DU and so had UNEP, and they took samples from inhabitants of this town, among others. Astonishingly, the samples showed that all the people tested had significant amounts of DU in their Urine samples. This included the BBC cameraman who had only been there for the week of the visit. Nic Priest's report is to be published and so I cannot give them here, but have made some averages of his results which were reported by the BBC and which I have given in Table 4 below.

Location	Number of adults	Mean 24hr DU excretion (ng)
Djakove, Kosovo	5	8.3
Klina, Kosovo	6	24
Bratunac, nr Sarajevo, Bosnia	3	22
Cameraman, Scotland	1	6.9

Table 4 Mean DU in urine samples from the areas in Kosovo and Bosnia visited by BBC Scotland in Spring 2001.

UNEP measurements of DU in Bosnia and Montenegro

The first major UNEP expedition to investigate and measure DU in the environment in Kosovo showed widespread contamination, although UNEP spun the report to suggest that this was not so. Their statement to the Press which claimed that there was 'no widespread contamination' was based on their definition of contamination as being concentrations which might prove harmful to health. Their report was criticised by Busby in a paper for the European Parliament meeting on DU in Strasbourg in 2001 [Busby 2001]. In particular, Busby pointed out that UNEP had made no measurements of air concentrations of DU in Kosovo. In response, UNEP argued that there would be no DU in the air. However, in the latest UNEP report which gives the results of their survey of Bosnia and Montenegro, UNEP deployed air monitoring equipment which showed the presence of DU in the air at two of the five sites they surveyed. This finding supports the suggestion that DU is long lived in the environment and is mobile through resuspension, and that this represents an important route for contamination.

Anecdotal evidence about Balkan peacekeepers

There have been many misleading statements from government ministers regarding the significance of leukemia deaths among Balkan peacekeepers. Recently a UK government minister suggested that 42 leukemia deaths per 100,000 peacekeepers was a reaonable sum and that therefore the handful of deaths observed should be seen as a normal situation.

Table 5 shows the numbers of deaths from leukaemia by age in males in England and Wales in 1998 and calculates the overall rate.

ages	Leukaemia deaths	Population males	
males 98			
20-24	27	1984394	
25-29	24	2168819	
30-34	24	1967765	
35-39	41	1711844	
40-44	27	1760461	
45-49	49	1700017	
50-54	86	1360926	
55-59	106	1281777	
60-64	138	1228076	
65-69	217	1129274	
70-74	316	919901	
	1055	17213254	Rate = 6.12e-5
			Rate = 0.612 per 10,000

Table 5 Leukemia deaths in men in England and Wales in 1998 by age group

The value, 0.612 is for all ages 20-75 combined and is not correct for soldiers who are younger. Leukaemia rates increase markedly in people above 50 as you can see from the table and this would suggest a higher expected number of deaths if this large age group were used as a basis for any comparison. It is unlikely that there would have been many soldiers older than 40. Assuming an age range of 20-40 (which is conservative) there should be 0.15 deaths per 10,000 exposed per year (i.e. the death rate in the men aged 20-40 is about 116/7832822 = 1.48 E-5 which is 0.148 per 10,000 per year. So in the year since the bombing we should expect approximately 0.15 per 10,000 or 1.5 deaths in 100,000).

In January 2001, Nippon TV were told of there were 7 leukemia deaths in Italian peacekeepers (50,000) and more recently Eddie Goncalves, a journalist in Portugal, reported 5 deaths from leukemia in the Portuguese peacekeepers (5 deaths in 10,000 with two in the 20-30 age group). Thus in those groups we observe 12 leukaemia deaths where 0.9 are expected, a relative risk of 13. Even if we use a two-year period since the war the Relative Risk is still 6.5

Italian peacekeepers study

The health of the Italian peacekeepers exposed to DU in the Balkans was studied recently by an independent group [Italian Report 2002]. Busby [2002] has made an independent analysis of this data for the UK Ministry of Defence DU Oversight Committee. In this study all cancers in 39491 veterans and peacekeepers were recorded over a period of up to five years following tours of duty in Bosnia and Kosovo. Observed numbers of cancer cases were compared with expected rates based on age and compared with rates for Italy and with rates for England and Wales. Using proportional incidence methods to allow for the superior base health of the soldiers, Busby was able to show that the rates for lymphoma were about 8 times higher than expected. The result was highly statistically significant. Crude rates, unadjusted for the healthy worker effect were between 2 and 3 times the expected number based on the analysis made both by the Italian medical team and by Busby 2002. The increase in lymphoma occurred between one and three years after the tour of duty. The Italian troops were quartered in parts of Bosnoa and Kosovo where there were highest uses of DU munitions and therefore this data represents important supporting evidence in favour of the belief that DU exposure is harmful. These results are shown in Tables 6 and 7.

Disease	Expected	Observed	Risk Ratio	Poisson p-value
Non Hodgkin	4.1	4	0.97	NS
Hodgkin	3.38	10	2.95	0.003
Lymphoma	7.48	14	1.87	0.02

Table 6. Expected and observed numbers of lymphoma cases in Italian DU study group with statistical significance based on cumulative Poisson probability.

Group	Lymphoma	All cancers except lymphoma	Ratio Lymphoma/All cancers	p-value
Italian group	14	11	1.27	
England and Wales equivalent	7.48	46.5	0.16	
Allowing for 'healthy worker'	14	1.77	7.9	<0.0000

Table 7. Using the England and Wales population ratio of lymphoma to all malignancies to calculate the expected value of lymphoma in the Italian study group in the 30-month period following exposure and allow for the 'healthy worker effect'.

Cancer increases in Sarajevo
There has been an extraordinary increase in cancer and leukemia in Sarajevo since the bombing. Sarajevo is close to the town where Nic Priest took urine samples and found DU contamination in people at least 6 years after the bombing. I append the latest figures from the Sarajevo Registry in Table 8.

Tumour Site	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**
Mouth and Throat	1 (1.1)	-	--	2 (2.1)	4 (4.3)	4 (4.3)
Digestive	15 (16.0)	50 (53.2)	36 (38.3)	55 (58.5)	68 (72.4)	82 (87.3)
Respiratory	12 (12.8)	15 (16.0)	20 (21.3)	34 (36.2)	44 (46.8)	51 (54.30
Skin and ligaments	-	2 (2.1)	1 (1.1)	10 (10.6)	8 (8.5)	9 (9.6)
Breast	3 (3.2)	11 (11.7)	14 (15.0)	29 (30.9)	34 (36.2)	37 (39.4)
Urogenic	8 (8.5)	8 (8.5)	11 (11.7)	18 (19.2)	27 (28.7)	28 (29.6)
Eyes	3 (3.2)	-	1 (1.1)	2 (2.1)	1 (1.1)	4 (4.3)
Lymphatic and Blood	1 (1.1)	6 (6.4)	1 (1.1)	7 (7.4)	19 (20.2)	26 (27.7)
Divers	-	1 (1.1)	11 (11.7)	18 (19.2)	11 (11.7)	7 (7.4)
All above	43 (45.3)	93 (99.0)	95 (101.0)	175 (186.)	216 (230)	248 (264)

Table 8 Cancer incidence in Sarajevo 1996-2000. Cases (crude rates per 100,000).

(Source: Sarajevo Tumour Registry)

Time lag considerations.

It is incorrect to discount such increases on the basis that the time lag is too short. The time lag between initiation and expression is given by the theoretical equations of Armitage and Doll, developed in the 1950s. The outcome of an exposure is biphasic [Busby 1995] since cancer development may follow immediately in cells which have a pre existing genetic lesion or later in cells for which the exposure causes a first lesion which is then developed following geometrical expansion of the cell line.

Chromosome testing UK vets
UK Gulf War veterans have recently had blood samples tested for chromosome aberrations in Germany. Results show a significant excess number of aberrations relative to German controls and are compared with Chernobyl levels reported by Shevchenko and Snigiryova [Burlakova 1995] in Table 9.

Group	Number of chromosome aberrations DiC + CR per 1000 metaphases scored	Mean Dose in excess of natural background	Number of metaphases scored
Gulf Veterans	7	0 + DU?	1001
German controls	0.5	0	34791
Chernobyl NPP staff	5.8	300-470mGy	6015
Chernobyl liquidators	4.4	220-350mGy	4937
Chernobyl controls	0	2mSv	3605

Table 9 Chromosome aberrations in Dicentric Ring and Centric Ring rearrangements in Gulf War veterans compared with measurements made on groups exposed to the Chernobyl accident. (Schott 2001, Burlakova, 1996)

There is a fourteen-fold increase in the frequency of the unstable rearrangements leading to centric rings and dicentric rings relative to German controls. Data from the Chernobyl exposures published by Shevchenko and Snigyryova in Burlakova 1996 suggests that the DU exposure of the veterans is equivalent to more than 500mGy externally delivered, supporting the belief that the ICRP calculations of dose are in error by an amount of the order of 2000-fold or more if we assume that the average dose of the veterans tested was 0.25mSv. Similar unexpected chromosome aberrations following exposure to Uranium dust have been recently reported for Uranium miners by Zaire et al [1997]

Expected effects

General ill health following radiation exposure is a well-documented phenomenon and appears to involve a form of accelerated ageing as well as immune system dysfunction. This has been recorded in the A-bomb survivors and also in those exposed to the Chernobyl accident and its fallout. Examples of the latter are seen in Table 10, where ill health in those living in regions of contamination in Belarus are compared. Overall annual doses in these areas are in the region of natural background, i.e 2mSv as expressed by the ICRP model. The matter is addressed at some length in the new model of the European Committee on Radiation Risk (ECRR2002).

Non cancer diseases	3 contaminated districts	5 control districts	P-value

Altogether	62,023	48,479	<.0001
Infections and parasites	3251	2119	<.0001
Endocrine, metabolism, immunity	2340	1506	<.001
Psychic disorders	2936	2604	<.01
Chronic Otitis	250	166	<.01
Circulatory system, hypertension, ischaemic heart disease	12060	9300	<.001
Of which: stenocardia	1327	594	<.01
Cerebrovascular	1981	1363	<.001
Respiratory	2670	1789	<.001
Digestive organs, e.g. ulcers, chololelitic, cholecystitis	7074	5108	<.001
Urogenital, nephritis, nephroses, kidney infections	3415	1995	<.001
Female infertility	84	56	<.01
Skin diseases, dermatitis, eczema	3377	2060	<.001
Osteomuscular, osteoarthritis	5399	4191	<.001

Table 10 Indices of somatic illness per 100,000 in adults and adolescents of 3 contaminated and 5 control regions of the Brest region in Belarus in 1990 (from Malko 1998).

8. Arguments from the US Department of Defense

The position of the US Department of Defense regarding the arguments relating to the health effects of DU on exposed soldiers and civilians may be conveniently examined by reference to the Information Paper, 'Depleted Uranium Environmental and Medical Surveillance in the Balkans 1-800-497-6261 (see www.deploymentlink.osd.mil/du_balkans).

It claims that:

- There is no widespread DU contamination and
- No study has found a connection between DU exposure and leukemia or any other pathology.

The paper has been reviewed by Busby [2002] and shown to be selective in its sources and biased in its conclusions.

9. Overall Conclusions

The Gulf War Syndrome and the increases in cancer and congenital effects in veterans of the Gulf War, the Balkans and in Iraqi populations are merely more and recent evidence of the serious error in the way in which the health consequences of ionizing radiation exposures are presently modelled.

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The health effects of Depleted Uranium weapons
Summary of evidence to the US Congressional Subcommittee on National Security Veteran's Affairs and International Relations Hearing
London 18th June 2002

Chris Busby, PhD

1. I have a First Class Honours degree in Physical Chemistry from the University of London and also hold a Doctorate in Chemical Physics. I was elected to the Royal Society for Chemistry in 1974 and am presently a member of the International Society for Environmental Epidemiology.
2. I am Scientific Director of the Environmental Consultants 'Green Audit'. I am scientific advisor to the Low Level Radiation Campaign. I am National Speaker on Nuclear Issues and Spokesman on Science and Technology of the Green Party of England and Wales. I am the UK representative of the European Committee on Radiation Risk based in Brussels and act as consultant on radiation and health to the Green Group/ EFA of the European Parliament. I am presently engaged in research funded by the Irish Government into the health effects of radioactive discharges to the Irish Sea.
3. I am a founder member of the UK government Committee Examining Radiation Risks from Internal Emitters, a new group set up by the Departments of Health and DEFRA to examine the validity of the present risk models for assessing radiation.
4. I am a member of the UK Ministry Defence Oversight Committee on Depleted Uranium.
5. I have been engaged in research into the health effects of low level radiation for fourteen years and have written many scientific papers and articles on the subject. I have been researching the health effects of Depleted Uranium (DU) weapons for three years. In July 2000 I was invited by the Royal Society to give a 30-minute expert presentation to their Committee on the Health Effects of DU. Six months later I was asked again by the Royal Society to give a second presentation on the health effects of DU and to discuss my scientific position with a number of invited scientists. It was partly as a result of my arguments that the Royal Society recommended the re-examination off the lymphatic doses from DU.
6. In September 2000 I visited the southern battlefield areas of Iraq and toured hospitals. I examined the levels of radioactivity and made measurements using a scintillation counter capable of detecting and distinguishing alpha and beta radiation. I also examined Iraqi data on DU levels and I visited hospitals in Baghdad and Basrah, interviewed cancer physicians, epidemiologists and patients (through an interpreter). I examined official Iraqi health data. I was the guest of the Iraqi Government but funded by a TV company who made a documentary. Upon return to England I was able to make ecological correlations between levels of alpha activity and incidence of cancer in adults and children as recorded by the Iraqi cancer registry. In addition I was able to show that the cohort of children who were exposed at or around birth showed the anomalously increased levels of leukemia in the age range 5-9. This age range is unusual for childhood leukemia which normally peaks in the age group 0-4, suggesting that this cohort was exposed to some leukemia causing agent at or around birth.
7. In January 2001 I visited western Kosovo and made measurements of radioactivity and DU concentrations in a number of locations where NATO maps had indicated that DU had been fired. I collected samples and air filters. The filters have not been analysed yet but some of the dust samples taken from the street showed high levels of DU measured as Uranium-238, Protoactinium-234, Thorium-234 and Uranium 234. Highest readings were

for the beta emitting daughters, Th-234 and Pa-234, and the isotope ratios suggested that the DU was removing itself from the dust by resuspension in the air.

8. Depleted Uranium is a dense, radioactive metal which is used in military operations owing to its ability to penetrate armour. Its radioactivity is conventionally expressed as 'low' owing to the long half-life of the main component U-238 which is an alpha emitter with weak gamma emissions. Its purported safety rests on the fact that alpha emissions cannot penetrate skin. However, DU is always in equilibrium with two beta emitting daughter isotopes Protoactinium 234 and Thorium 234, which pose an external radiological hazard and may be used to detect the presence of DU in the environment. On impact with the target, DU penetrators are converted with up to 80% efficiency to particles of ceramic Uranium Oxide of diameter up to 1 micron. Such particles are long lived, widely environmentally dispersed and may be resuspended in air and inhaled.

9. The conventional radiological assessment of DU is based on its external irradiation and the use of the model of the International Commission on Radiological Protection (ICRP). This is essentially an external irradiation model which employs the cancer yield of the survivors of the Hiroshima bomb to assess cancer risk following exposure. The model and its source are unable to accurately assess risk from low doses of radiation delivered by point sources (e.g. particles of DU) from within the body. Evidence of the failure of the ICRP risk model for internal irradiation has accumulated in the last ten years and particularly since the Chernobyl accident. There are philosophical, mechanistic epidemiological and biological reasons for discounting this model. Such evidence is so compelling that the UK government has set up a new committee (Committee Examining Radiation Risk from Internal Emitters, CERRIE) to investigate and report on the issue. In addition , the European parliament has called for a re-assessment of the ICRP model.
10. Among the evidence that shows unequivocal evidence of the failure of the ICRP risk model is the observation of infant leukemia increases in five separate countries in the cohort of children who were in the womb at the time of the Chernobyl fallout. Comparisons of the observed leukemia numbers with those expected on the basis of the ICRP model shows a discrepancy of around 100-fold. In addition, the new technique of minisatellite DNA testing has revealed a seven-fold excess of mutation rates in the offspring of children born to the Chernobyl 'liquidators' compared with siblings born before the accident. This demonstrates a 1000-fold error in the ICRP model for heritable mutation. Such errors are similar to those needed to 'explain' the Sellafield and other nuclear site cancer and leukemia clusters. It follows that the ICRP assessment of DU is similarly faulty and the health effects of DU exposure are thus seen as a particular case of a general error in the modelling of risk from internal radioactive point sources.
11. A second assumption made about military use of DU is that it harmlessly disperses and becomes part of the general natural Uranium background. DU is not at all the same as natural Uranium since it is in the form of micron sized pure Uranium particles. Natural Uranium is an ore with low specific Uranium content. Therefore looking to health effects in Uranium workers and miners will not give meaningful results. Evidence from Iraq and Kosovo suggest that these particles, once formed, are resuspended in sunny weather and are rained out, thus becoming part of a geophysical cycle where air concentrations of DU particles represent an exposure route for many years after the use of the weapons. For example, I measured significantly higher alpha activity in the air in southern Iraq than northern Iraq, and also collected DU from underneath melted snow in Kosovo a year or so after its use. Isotope measurements using gamma spectroscopy revealed anomalous ratios consistent with the resuspension of the DU particles in air.

12. Secure evidence of the health effects of DU exposure is scarce. However a number of studies now support the belief that exposure to DU is the cause or a major causal component of a range of ill health effects including Gulf War syndrome. These are briefly reviewed.
13. General ill health following radiation exposure is a well-documented phenomenon and appears to involve a form of accelerated ageing as well as immune system dysfunction. This has been recorded in the A-bomb survivors and also in those exposed to the Chernobyl accident and its fallout.
14. The spectrum of ill defined conditions and immune system compromise together with leukemia, lymphoma and cancer that make up 'Gulf War syndrome' is easily accommodated within the expected outcome of radiation exposure.
15. Increases in cancer and other ill health have been reported in Iraqi populations. Leukemia in Iraqi children follows an anomalous patters with regard to the early age related trend which suggests exposure at the time of the Gulf war is the cause. In addition the higher levels of leukemia in children and adults are in the South where the DU was used rather than the north where it was not. This spatial trend correlates with measurements of DU and alpha activity. In addition, there are many reports of congenital anomalies which follow the same trend in space.
16. There are reports of increased levels of leukemia and lymphoma in Balkan peacekeepers. Using data supplied by TV journalists I have been able to calculate an excess risk of about eight fold in leukemia mortality among Italian and Portuguese peacekeepers.
17. Using data given in an official report commissioned by the Italian Ministry of Defence I have been able to show that the 39,000 Italian peacekeepers in Bosnia and Kosovo suffered a significant eight-fold excess risk of lymphoma which expressed itself within three years of their tour of duty.
18. Professor Schott of Berlin has measured chromosome defects in nine UK Gulf War veterans and shown that there is a significant excess relative to a control group of the general public. Based on data from the Soviet Union on chromosome defects in Chernobyl NPP workers, I have calculated that the effective external dose needed to cause this level of chromosome damage is about 550 mSv. This suggests an error of about 1000-fold in the assessment of risk from DU particles by the ICRP model.
19. Cancer increases in Sarajevo following the use of DU are up to 20-fold, particularly for lymphoma and leukemia.
20. The main arguments of the safety of DU given by the US Department of Defense are to be found in their document on the DU in the Balkans: this document is biased and selective in its sources.
21. Thus I conclude that the question of the health effects of exposure to DU particles is a subset of a larger issue about the health effects of exposure to internal radiation from man-made sources. The models used to assess this are obsolete and faulty. The manifest consequences of exposure to DU involve general system damage and cancer and because such effects are seen in non-military populations, unexposed to the various other putative causes of the syndrome, I believe that DU is the main causal origin of Gulf War Syndrome.

Mr. SHAYS. I have a feeling we all have accumulated a number of questions we want to ask you and we are going to start with Mr. Sanders. We are going to go to Adam Putnam and then we are going to go to my colleagues and then Mr. Perot and then I will ask questions. It has become a long day but this is a very important part of this day. Mr. Sanders, you have a lot of questions there, don't you?

Mr. SANDERS. I do. First of all let me thank this panel, Mr. Shays, I and Mr. Putnam have been involved in many, many hearings and I have to say certainly this panel has been one of the most informed we have heard from. I have to tell you my emotional reaction and this is a general question that I would like anybody here to respond to. In the US we have a saying 'It's like ships passing in the night'. All of you have done very specific evidence. You have done studies, you have done tests which show the extremely harmful impact of organophosphates of vaccines of the DU. You have your charts, you have your concrete evidence and you have presented that today. We go back to the US and we have a panel of government scientists and representatives from our veterans administration, or Department of Defense who are telling us after hundreds of millions of dollars being spent on research, 'Well we just have no evidence that there is anything called Gulf illness. We have no concrete evidence at all.'

So, the first problem that we have is either you are all totally crazy which I do not think, needless to say, or something is very, very wrong with the state of government both in the US in terms of the government and here in the UK. So, my very first question to you and you can talk about the UK, is what the hell is going on when you have done this research and your government is still claiming they do not know if there is a problem. Something is crazy here. it's either you or them. What's going on?

[Laughter.]

Dr. BUSBY. Well, I have to say, this new committee, the Cherry Committee examining the radiation, the reason that came about was because of the BSE affair. It is a very large mistake that was made in this country and there was a science advisory committee set up by the government on BSE. It was chaired by—

Mr. SHAYS. This is 'Mad Cow' disease?

Dr. BUSBY. Yes, 'Mad Cow' disease. This committee advised the government that BSE could not cross the species and no way it could cause any harm and in fact that is entirely wrong and so as a result the government became a bit concerned and thought an advisory committee might be biased or self-selecting. So we suggested that they set up a new kind of science advisory committee in opposition but set it up to be opposition like parliament, like Her Majesty's loyal opposition and under those circumstances you had two opposing sets of scientists. One from the industry and the others from citizens' representatives or from the NGOs and they were brought in but the report would include both their positions and then the politicians could take evidence from them.

The reason we did this is in the last years, 20 years, anthropologists have turned their searchlights on society and primitive people but now they have decided scientists are fair game, or ran out of people to study and were surprised that scientists are no different from anybody else. If you want to go down a particular road, you just accumulate the right sort of scientists who allow you to go down that road and this potentially is the answer to your question. Science is not something handed to us from heaven as nature sees it. It is what we put in ourselves and some of the people who put things in are not exactly morally honest or people I trust.

Mr. SANDERS. We thought only politicians were political.

Professor HOOPER. The science that has been commissioned and done is often poor science designed not to get the right answer and there was the study on birth defects showing no birth defects among Gulf War veterans' children. it ignored whole strands of evidence and was completely biased. Dr. Hans Khan from the Gulf War veterans shows there is birth defect among them so the initial science was badly flawed.

The Medical Assessment Panel is working with animals. We have the "animals" walking round or in bed. They are suffering. Why don't they take samples and examine their immunology? We have these people who are sick and ill, organophosphates have been looked at. Farmers who were working but ill. No one looked at the farmers who were too sick to work. This is an example of bad science designed not to get the answer and this is what happens again and again.

Dr. ROOK. Let me emphasize what Professor Hooper said. The problem is getting to the veterans to do any work on them at all. The panel here, money is only scanned towards animals and epidemiology. It makes sense to do the epidemiology, but it makes sense to get the samples as early as possible.

There is a series of phase one clinical trials and in the civilian sense, if you have been subject to phase one trials, there will be set up a stringent series of tests and

sampling and follow up. We tried to get money to work on the Gulf War veterans. Having tried a pilot study with the medical assessment panel which was based a few hundred yards from our own laboratory, we were unable to, the MoD would not let us. Then when we put in an application to do a large study piggy-backed on a large epidemiology study, we were told we could not because we had not done a pilot study. A simple old-fashioned trick of 'blocking'.

Mr. SANDERS. My last point. In my view the most significant point that every one of you has made is that what we call Gulf War illness is not something just unique to people who served in the Gulf. Everything that exists in Gulf War illness, their problems one way or another exist in millions of people throughout the world. That is the significance. Every illness, whether it is ALS or chronic fatigue syndrome, all exist also in the civilian society. In many ways our Gulf War veterans were canaries. People thrown into an enormously toxic climate, greater concentration. They came out of that more ill than most civilians would be.

Given that if you agree with my perception, do you think that in the back of government's mind you have a chemical industry, you have a nuclear industry which is not necessarily enthusiastic about people learning of a negative impact of chemicals or nuclear powers? Is that a factor in the reluctance of British and US governments to go forward?

Dr. JAMAL. I think my experience, I believe that is one of the important reasons; coming back to the question of organophosphates in 1992 when we started there was a confusion in the literature. Some of the studies, epidemiological studies, some of the studies went that way, but when you really looked at them you found that some of them were not based on the science. Epidemiology is good if it is directed with good science. We did the first study to define what is it you will look for in the epidemiology. So if you don't define what you want in the epidemiology based on good basic science, not necessarily in hundreds or tens of thousands of people, then when we designed the cross-sectional epidemiological piggy-back on the first one we found what we found and it was found by the scientific community; but that is an important point.

Professor HOOPER. if you look at organophosphates, they have been withdrawn now. We were warned about toxic compounds. 51 stringent safeguards were to be used, people, crofters were to be advised before the spraying was done and the whole thing has got lost and fewer and fewer of the compounds have been withdrawn because they are too toxic. But, it has been too slow and far too many passengers.

Dr. JAMAL. The Gulf War veterans, as far as I know and at least the British veterans were exposed to organophosphates which were bought locally but most of these were not licensed to be used in the western world, not in the UK not in the US, not in Europe. So, that is also to be borne in mind.

Mr. SHAYS. Mr. Putnam?

Mr. PUTNAM. Dr. Hooper, you said that the Gulf War was the most toxic war?

Professor HOOPER. Yes.

Mr. PUTNAM. You went on to elaborate on the general hypothesis, vaccine/no vaccine, cholinergic triple whammy as you put it which talks about pyridostigmine bromide and the sarin vx but not DU?

Professor HOOPER. DU came at the end. I picked up, I have a slide which I did not show you, Chairman, because I was conscious of your timeframe. The Institute of Medicine in the States has identified 33 toxic exposures of Gulf War veterans. I was picking out what I had been given, ones affecting people, those were vaccines, the triple whammy and DU and I think the plume smoke as well played a significant part. Studies have not been done in this country in that area although there has been a very good study in the States.

Mr. PUTNAM. So, DU is one of them?

Professor HOOPER. Yes.

Mr. PUTNAM. Dr. Jamal, you are focussing solely on organophosphates?

Dr. JAMAL. It was on the slide but right at the bottom. The slide did not show completely. It is chemicals and pesticides. Multiple vaccinations, DUs.

Mr. PUTNAM. Dr. Busby, you say the main cause of these were the cause of Gulf War syndrome?

Dr. BUSBY. Basically the new serum is in the chemical industry and the cancer people talk about the nuclear and everyone gets hung up in the middle. So without more money, and meanwhile everyone dies, and this is why I was cautious of saying if you had to take a view it would be the neurological symptoms, with agents which are discovered but what radiation dose causes mutation, generic mutation and inherited damage. So you can see the damage we saw after Chernobyl and all of these symptoms here have been recorded in the people who were radiating at Hiroshima and also the people living in the contaminated regions.

Nevertheless I think the neurological symptoms could be placed at the door of the organophosphates and to the vaccination program but the mutation-based illnesses I don't think they are more than that, they are radiation damage, damage with genetic material.

Mr. PUTNAM. So everyone is on the same basis?

Dr. BUSBY. I think so. If you shoot 100 people with different colored bullets then you find dead people with lots of different colored bullets but they will all be dead and if you try to look for a similar cause you might say, 'This is dead person syndrome' and then it is a complex reason but I don't think the cancers and leukaemia and lymphoma are caused by organophosphates.

Professor HOOPER. I did not show it but I have a slide in the statement showing the various examples that can be done by the different exposures on the body and it has crosses all over it. They are all capable of creating the genetic damage that can be done by nerve agents as well as DU. It produces free radicals and you can cause damage quite extensively. So, there are established mechanisms which can cause damage and many of them overlap and can be provoked by different agents. So the cocktail effect is troublesome. First of all are you adding or are you multiplying?

Dr. BUSBY. There were none of these in Kosovo.

Mr. PUTNAM. You said 350,000 tons?

Dr. BUSBY. Yes, 350,000 in Iraq and about 10 tons in Kosovo but although 10 tons might sound less than 350,000, I calculated about 3m particles for the whole of every person in Europe which is a lot of particles.

Mr. PUTNAM. None of you received any government funding for the studies?

Dr. BUSBY. Unless you go onto the DU committee.

Dr. JAMAL. Not on Gulf War illness.

Mr. SHAYS. Can we clarify something. Are you free to go after US studies? You are not inhibited being based in Great Britain? The answer is any of you can go after any study, nationality is not a factor or location is not a factor.

[Witnesses indicating in the affirmative.]

Mr. SHAYS. Do any of you have US funding for projects?

[Witnesses indicating in the negative.]

Mr. SHAYS. I interrupted, I am sorry.

Mr. PUTNAM. You have not received any. How many of you have applied?

Dr. MACKNESS. I received some from the MoD.

Mr. SANDERS. British MoD?

Dr. JAMAL. I have applied to the British MoD and did not get any funding. I applied to the American DoD jointly with two others who were turned down.

Dr. BUSBY. The Goldsmith Foundation, the Government of Ireland, anywhere but the Government of England.

Dr. ROOK. I did apply to the MoD but was turned down.

Professor HOOPER. I have not applied to the MoD or the DOD.

[Laughter.]

Professor HOOPER. Ours is done on a shoestring by the courtesy and generosity of the university where I have now retired from but I still do what I can.

Dr. ROOK. In view of this discussion, whether there are competing hypotheses or not, I made the point at the beginning of my talk—

Mr. PUTNAM. No, I spotted that.

Dr. ROOK. But I think the epidemiology study by Cherry in Manchester is where they cluster different types of symptoms together. What we might be seeking to see is three types of cluster. We have Dr. Busby on mutation, the central nervous system clusters and then the peripheral mal-functions to do with the immune system and put that way it makes quite a lot of sense—

Dr. BUSBY. The multi-vaccine work study is based on the British work—

Dr. ROOK. I have not done work on the Gulf veterans at all. My work was on the rest of science where the notion that bacterial components have powerful regulatory effects is now well established but I have not worked for the Gulf War veterans.

Mr. PUTNAM. Are you aware of someone, all of you made reference to environmental factors, psychological and physical stress. Is there someone out there who is the primary focus?

Professor HOOPER. I think the Cherry/McMahon study which you will hear a little about next from Mr. Wessely has picked up vaccines and pesticides with suggestions of PB and that database is not publicly available to interrogation or at least it was not, so it makes it difficult to follow up. i think it is worthwhile saying at this stage that I think we all owe a great deal to Ross Perot and Bob Haley because without that work that was a pattern of work I wanted to see carried out in this country through epidemiology and we are getting down to some investigations but what Bob Haley did was to go through and show clear damage which is indisputable and I

am sure we would find the same thing with other veterans. He took a lot of stick not just from politicians but from proper scientists as well but we owe him a great debt for it and we owe you a great debt as well. Thank you.

Mr. PUTNAM. Dr. Jamal, your work on the effect of organophosphates on the farming population, that was only in northern England and Scotland, is that correct?

Dr. JAMAL. It was Northern England and Scotland. I based it on Scotland.

Mr. PUTNAM. Is there similar evidence from the US that would reflect the equivalent rate of neurological damage among the farming population?

Dr. JAMAL. There are some studies made from california, people who spray, there is literature. There are others here and there but I don't really think US farmers dip sheep in the same way. We looked particularly at farmers dipping sheep and using these compounds in that context.

Mr. PUTNAM. Thank you, Mr. Chairman.

Mr. SHAYS. Lord Morris, you have some questions?

Lord MORRIS. Quickly, Mr. Chairman. My first question is to you. I understand you asked the US General Accounting Office, the GAO, to look at plume models used by the US Defence Department to determine who might be exposed to the plume panacea?

Mr. SHAYS. That is correct, we did that.

Lord MORRIS. Can I ask should locations be included in those studies?

Mr. SHAYS. That would make a lot of sense. We will make sure that is done.

Lord MORRIS. My second point is I understand that the MoD has now agreed to fund the study of cancer in Gulf War veterans but there are very strong indications as has been said today, the Italian peace-keepers in Bosnia had cancer clusters discovered. There is no reported intention to undertake a similar study among our troops who served in the Balkans. If you are a veteran, that is a serious omission. I wondered if the Panel can comment?

Dr. BUSBY. When the Mod were putting together their data on what course of studies they would fund, they sent me a draft of this to comment on and I took up a number of these points and suggested that they did fund epidemiological studies on cancer and made a number of other suggestions to them but they have always been blocked. I just get a rude letter back saying effectively 'Sod off' really and I always find them extremely hostile. There is no discourse whatever, who do you think you are, where is the army and then when of course it was finally published it was published and you know the results.

Another thing, they are not going to look at, for example, is the connection with uranium dust. They say DU goes into the dust and becomes one with the content of the earth and if we suggest otherwise they say, no it does not. You just get no further.

Mr. SHAYS. Mr. Perot?

Mr. PEROT. First I would like to thank all the Panel for what you have been referring to. We have had similar problems to the ones you have had—

Mr. SHAYS. Mr. Perot, it may be that you are further away, but we can't hear you.

Mr. PEROT. We have had problems like you have. We had problems getting to the Defense Department. This is back in the earlier period of time?

Dr. JAMAL. Yes.

Mr. PEROT. Ours has changed its position and is working hard to solve this problem and if we get that we can get a strong alliance between our two countries, get the same thing over here. Nothing could be more important than that we all work together as one team. So, that is something. We certainly would give the highest priority to you. My question really is have you looked at lead?

Dr. BUSBY. Yes. Certainly there is a question of having metal.

Mr. PEROT. It could have toxins?

Dr. BUSBY. Yes, it is toxic to the kidney, that is the particular organ.

Mr. PEROT. I guess my question, you have answered my fundamental question. To attract the best advice you have to have government facilities, otherwise you have other options, where to go at the time. It appears that so far you have not been formally received when you come in with concepts. Is that a fair statement?

Dr. BUSBY. The reason I did it is essentially because I can't bear the idea of all these children dying. So, I don't do it for money.

Mr. PEROT. That was very clear. You take the risk of going to Iraq.

Dr. BUSBY. That was scary.

Mr. PEROT. Yes, I'm sure it was. Those are my questions.

Dr. JAMAL. We have been in contact with Dr. Haley for many years now and I am so glad, absolutely delighted, that he was able to do those absolutely first class studies and I think we very much welcome the idea to have collaborated today and will continue with Dr. Haley.

Mr. PEROT. I would love to see Great Britain involved in a collaborative activity. The very reason if for no other reason that our government wants to bring in the best man among our allies to collaborate to come up with answers to these problems, that would be wonderful brain power. That is all I have.

Mr. SANDERS. If you don't get to the Gulf, move to Texas.

Mr. PEROT. You can stay right here. It's a small world. Anywhere in the world we can get together and collaborate. Once you collaborate you get something done.

Mr. SHAYS. Depending on how you do the numbers we have two to five thousand doctors in the Department of Affairs, defense affairs; when we asked who had specialty in the workplace handling materials they could think of no-one and eventually got back to us and gave us two names so it was not surprising that when veterans came to talk to them that they had no lid on it and it was not their field, it was not their interest and our veterans felt like when they were talking to doctors, they looked at them, well you know the story, so it's not surprising to me—well, it is surprising. I would think what would have happened is that our department of special affairs and department of defence would work overtime to find doctors with those specialties and even though we raised it as a question, we still did not see it happen.

My first question to all of you and I know you might find this discomforting, but I need to satisfy my own curiosity on this: Is there anything that was said by one of you by someone else that you may disagree with or say it is overemphasized or under-emphasized. Mr. Mackness, is there any one thing Drs Jamal, Rook, Busby or Hooper said you would want to say 'Yes, but'?

Dr. MACKNESS. No, but while I have been sitting here listening to the discussions I have interestingly come across another thought. It was about the uranium causing membrane damage and organophosphate produces damage that is done to cell membranes so if it protects against organophosphates and it protects against theoretical damage in uranium we may have a universal link because the enzyme is low in the veterans.

Mr. SHAYS. In your work have you done any genetic pre-disposition?

Dr. MACKNESS. To what?

Mr. SHAYS. In other words, basic genetic make up makes them more susceptible to Gulf War veterans?

Dr. MACKNESS. No, not genetic.

Mr. SHAYS. Anything, Dr. Jamal that the others said that you want to put in a different light?

Dr. JAMAL. Well, I think if I may summarize I think there is a link in a combination between all of what has been said. I would agree with the proposal it seems to be neurological but there is a radiological risk, the links being enhanced by the chemical because they are genetic as well as toxic to the chromosomes and cause mutation. So there may be an association there. For instance, the blood barrier alters when immunology alters and I think there is a linkage between all the approaches and there is one way to find out, by doing further studies.

Mr. SHAYS. That question I asked the first two, any comment?

Dr. BUSBY. I don't know enough about their areas to be able to really comment sensibly. From looking at their results, a lot of them seem to me quite persuasive. There seem to be some elements of their presentation that I would call arm-waving but we all do that and it is a shorthand for ourselves to say we know we have an easy way of communicating. So, I am not taking them to task but there are areas where I would say, 'Exactly what do you mean by that and how do you know that is true'?

Mr. SHAYS. We only gave everybody ten minutes—

Mr. SANDERS. You are speaking for the audience—

Mr. SHAYS. They knew their audience. I am going to come back to you because I have a theory. Dr. Rook?

Dr. ROOK. I think there has been a problem in many studies due to the fact that the ministries have been unwilling to let people examine the bases themselves and unwilling to get clinically-based studies superimposed on the epidemiological studies. There have been a lot of studies of Gulf War veterans, a small number of veterans have been looked at. One of the studies Mr. Busby mentioned about uranium in the Gulf War veterans, maybe we are all being exposed to uranium in the modern world but it is not the fault of the world. If people are not given ready access to the patients, to do private studies, then it is very difficult to do and another point Dr. Jamal made, it is helpful to do pilot studies because it helps epidemiologists to know what to look for.

The idea epidemiologists can do wonderful studies is not true. Every epidemiologist needs to know what they are looking for. It is not the different questions you ask but what to look for. So we have been hindered in a sense.

Mr. SHAYS. Professor Hooper, anything you would put in a different light?

Professor HOOPER. No, I think I have been rather reinforced, rather than different lights. On the first slide I put in about the new endocrine immune system and I think that is not a novel concept and it ties together the diverse system, the nervous talks to the endocrine system and all this cross-talk going on in the body and this shows that these messages go not just to the cells that you want to talk to but other cells as well that you need to unscramble. So, I feel we have a conceptual framework for our thinking which allows us to understand the different insults which have come to the Gulf War veterans and they are formidable and very extensive.

Mr. SHAYS. It strikes me that you have a lot of goals. One is that you are not getting funding, the other is it strikes me that your theories are not exclusive, let me put it this way: It strikes me in many cases you are complementing each other, not working in competition. That is the way I felt. I would be interested to know, I think with DU in the US we have not moved forward that way and maybe because the implications are quite significant, we used DU in the structure of a tank and we used DU to penetrate. We use it in a lot of different ways and if it was found to be harmful to the people, who would be looking at it afterwards? It puts into play a lot of questions about what were you doing and what were you using?

I am struck by that but I would like to know the cost of your project. If you did a study on this, what kind of dollars are you talking about?

Dr. BUSBY. What kind of study are you talking about?

[Laughter.]

Mr. SHAYS. What kind of studies did you ask for? let me be more clear. You have made requests for funding. What kind of dollars are we talking about?

Dr. BUSBY. I am looking to do two years' study and in pounds about £80,000.

Mr. SHAYS. In my way of looking at it that is not a lot of money in the framework of the context that I have—

Mr. SANDERS. It's too small a sum of money, we can't give it to you, sir.

Dr. BUSBY. I'll make it four years.

Mr. SHAYS. I am not being reckless about the question. I did not know if you would say 8m.

Dr. BUSBY. The truth is these studies are not difficult. They require somebody to do a certain amount of work for a certain amount of time. I am not looking to become rich, I am just interested in the work, but I can't do the work because I am not funded.

Mr. SANDERS. I think Dr. Busby raised an interesting point about the British government. I think there are, it is like a political issue, these guys and we look at the world in Gulf War illness in a particular way. Then there are another group of people who have access—

Mr. SHAYS. 300m in the US.

Mr. SANDERS. Which has not given us a tiny fraction of the information revealed to us today. So, we have to say, okay, there are two ways of looking at the world. Let's continue to fund, but let's give these guys half the money and see what they can do with a few hundred million dollars and see where we proceed. But, there are two world views out there and one world view is getting all the money.

Mr. PEROT. I suggest that the best thing that can happen is that you address Mr. Blair and I think you will see a sea change in activity in this country. We can still collaborate but you will have the opportunity to collaborate with our science we have in the US but I feel very strongly the first step would be if you had the man to hear what we heard today direct from you just sit down and give, in little over an hour, present to him, I think we will see all the collaboration will still take place between the US and Great Britain. But, suddenly, if we start funding your work and have Great Britain, they are moving along on the dollar, I would like them to have the opportunity to do it and get this one theme.

Mr. SHAYS. If I may suggest it is a very fine idea. We are going to find a way to intensify in the US in a seminar type opportunity where we can call in some of the DoD folks, have you all make a presentation a little longer than you have done now and then ask for there to be some response and dialogue. We might do it on an informal basis. I have more questions I could ask you but I have a feeling you all should come before a Panel again.

Mr. SANDERS. Would you come to the US and confront the DVA?

Mr. SHAYS. Can you use a different word?

Dr. BUSBY. 'Confront' is an important word.

Mr. SANDERS. Let us help you while your research is not done.

Mr. SHAYS. We have other questions but I think what we are going to do is we might ask for you all to submit some responses for the record before we close the record and then we are going to find a way to get you to the US to be able to continue this dialogue and so unless there is some last comments—

Dr. BUSBY. There is something I meant to say when you were talking. You should know that the World Health Organization and the International Atomic Agency have an agreement not to research, or the WHO is constrained by this agreement not to research the relationship between radiation and health which has to be left to the atomic people which is nuclear power.

Mr. SHAYS. Is that your theory or fact?

Dr. BUSBY. No, it is fact.

Mr. SHAYS. I have never heard that to be true and it would be pretty stunning.

Dr. BUSBY. It is true, it was done in 1969. I could show you the document.

Mr. SHAYS. I would like that submitted to our Committee. We are running a little behind on time and I am concerned about that but you all were an excellent panel and we thank you. Dr. Jamal, for the record you were already before our committee and you were an excellent witness and we would love to get you back there again.

Mr. SHAYS. Our final speaker today is Professor Simon Wessely from Guy's, King's and St. Thomas' School of Medicine and author of epidemiological studies relating to Gulf War illness

STATEMENT OF SIMON WESSELY, AUTHOR OF EPIDEMIOLOGICAL STUDIES

Professor WESSELY. This has been a very large study group, you have already heard them. The basic thing of what we have done in working on this problem since 1996, our approach is that there were 53,000 British armed forces in the Gulf and we cannot study them all so we have run a random sample of one in ten. We are absolutely adamant that it is worth the effort because at the end we want to say something not only to the small number of veterans we studied but the whole veteran community. So we can say. 'Yes, you have a problem you should worry about or no, you don't.'

I just walked in at the end with the epidemiological studies and then I want to go on to clinical studies which we are now doing generally for the whole UK government.

We traced 4,000 UK armed forces in the Gulf and we compared them with 4,000 UK armed forces who went to Bosnia so we compared them with people fit for active duty and went off on a very nasty and hazardous deployment in 1992 and compared with 4,000 who did not go to either conflict. That took me about 30 seconds to say, two years to do and it was extremely difficult.

I give you a list of bullet points and we found compelling evidence of the evidence of the UK armed forces in the Gulf. It is not found in those that went to Bosnia. There is an undisputable rise in and a decline in physical health, a two or three-fold rise in symptoms and because we have the random sample that is representative of the entire appointment we can say without any shadow of a doubt there is a serious problem in the forces that went to the Gulf and I think we have shown that definitively in the UK armed forces and it has been confirmed by the Cherry Group.

We did not find evidence of a Gulf War syndrome on a statistical analysis, there was no difference between that and the Gulf era. It was a relatively academic point of interest to relatively few people.

Most important is we found a Gulf War health effect but no evidence of a unique illness. That is what McFarlane and others groups have shown. We found these were symptoms which were associated with certain specific exposures and key ones using records that were available in about one third of the personnel who were receiving multiple vaccines, not any singular vaccine, but multi-vaccines which was a clear cut relationship, the more vaccines you received the more likely you were to have symptoms some years later and we thought that was because they were given only when you were serving in the Gulf.

In Germany there was not an association but I have to say that is a more tricky analysis and there is some dispute how valid that is, if it is valid, for reasons we will come on to. It is difficult to look at other exposures and we found generally sick people reported more of the exposures we could not report independently and it is difficult to know what to make of that.

So, we did that and then we went on to clinical studies you have heard about which are now concluded and we got 400 veterans who were sick from the Gulf, well from the Gulf, sick from Bosnia and well from Bosnia and we got them to come to King's. What did we find there? Some things were good, some not so good. Their neurological health, concentration, memory and so on and also some had symptoms and complained of problems and generally they were good so the findings were reassuring.

Psychiatric examination showed there was an increase in depression and anxiety, not substantial but it was there. The most particular interest was post traumatic stress disease which was quite small, from 1 percent to 3 percent in Gulf War veterans which signified the Gulf War veterans who did not have post traumatic stress disease. It does not exclude the situation, it means psychiatric diagnoses are not the answer. We have carried out neurological studies, I am not a neurologist but that is currently under review.

Looking at the systems concentrating with the single fibre genes so on and so forth, it is a little difficult to talk on that. We have also done immunological studies and you have heard from Graham Rook. We can say we have already on epidemiological grounds confirmed the brand of this hypothesis and being immunized after a condition of stress which is why I emphasize the finding of the vaccines only seems to have had the effect in the Gulf.

[The statement of Professor Wessely follows:]

Subcommittee on National Security, Veterans Affairs and International Relations:

London, June 18th 2002

Presentation by Professor Simon Wessely on behalf of the King's College London Gulf War Illness Research Unit

A. WHAT WE HAVE DONE

Since 1996 we have followed a logical programme of research into the health problems of UK Gulf War veterans. We began with a major epidemiological survey involving over 12,000 UK servicemen and women. These were divided into three groups. The first is a random sample of all UK Gulf veterans, including all three Armed Services, and both those still in service and those who have left service. There is little point in comparing the military with civilians, so the comparison groups all came from the military. The first were those deployed on the UN Peacekeeping missions to Bosnia (Op Grapple) beginning in 1992, as a control for being fit for active service overseas. The second, which we have called ERA, was a random sample of all those who were in the military in 1991, but did not serve in either the Gulf or Bosnia.

We completed this epidemiological study in 1999. All the results have been published.

Our second stage was to study intensively selected samples from the epidemiological studies. These consisted of four groups. First, a random sample of Gulf Veterans with physical disability (GULF ILL). Second, a random sample of well Gulf veterans (GULF WELL). Third, Bosnia veterans now reporting ill health (BOSNIA ILL), and finally ERA veterans now reporting ill health (ERA ILL).

All attended King's College Hospital for two days of intensive tests. These included general health assessments, followed by detailed neurological, neurophysiological, neuropsychological, psychiatric, immunological, dermatological and other investigations. Samples were stored from all veterans for further biochemical analyses. The results of these studies are just starting to appear.

One of the main questions is whether Gulf War veterans are getting better, worse, or staying the same. Answering that question is the final part of our programme. We are one of only four groups, and the only UK group, who have performed evaluations of Gulf War veterans at two or three time points. Our follow up study of the original cohort has now concluded, and is being analysed.

Alongside these studies we have also conducted a programme of research into other post combat syndromes, largely based on the War Pensions awarded to UK servicemen and women since 1900.

The advantage of the strategy we have chosen is that because we began with an epidemiologically defined cohort, that was representative of all the UK Armed Forces, and because we selected individuals, both sick and well, from those cohorts, we can say that our results at all stages of the programme, including the intensive clinical phase, can be generalised to all UK Armed Forces who served in the Gulf War.

B. WHAT HAVE WE SHOWN

EPIDEMIOLOGY

- Substantial worsening of subjective health in Gulf war veterans
- No change in Bosnia or Era veterans
- Increase in all symptom defined conditions – such as CFS, MCS, Post traumatic stress reaction etc
- Worsening of health when veterans leave the Services
- Strong rank/SES gradient
- No unique Gulf War Syndrome
- Ill veterans report more of every hazard and exposure inquired after
- Specific link between CBW prophylaxis and multiple vaccination (note UK schedule differed from US)
- Link seems to be restricted to those vaccinated in theatre
- No gender differences on any outcome
- 18% of UK Gulf War veterans believe they have Gulf War Syndrome

C. CLINICAL STUDIES

- Neurophysiological and neurological studies are under review
- Immunological studies partially confirm the Rook Zumla hypothesis (Th 1 Th 2 shift)
- Anti nuclear antibodies are not elevated in Gulf War veterans
- Paraoxonase studies under review
- Formal psychiatric disorder is elevated in disabled Gulf War Veterans
- But not enough to account for all observed morbidity
- Post traumatic stress disorder (PTSD) only accounts for a small amount of this
- Neuropsychological studies do not suggest major deficits
- Concentration and memory problems are common, but only weakly related to objective deficits

D. FOLLOW UP STUDIES

- Differences between the Gulf veterans and the other groups are diminishing, but are still significant.
- Those leaving the Armed Forces have worse mental health (post traumatic stress reaction) than those remaining
- Most analyses are still being undertaken

E. QUALITATIVE STUDIES

- There remains considerable loyalty towards the Armed Forces in Gulf Veterans
- There are many more Gulf veterans, including those still serving, who believe their health has been affected by service in the Gulf War ("tip of the iceberg")
- There is major problem of trust between many UK veterans and the Ministry of Defence.
- One of the principal effects of service in Former Yugoslavia has been an increased appreciation of the benefits of living in a peaceful democratic society.

F. HISTORICAL STUDIES

- Gulf War Illness is not the first post combat syndrome
- Post combat syndromes have existed since the Victorian Era
- There is evidence that the nature of these syndromes is gradually changing
- They are a response to the unchanging stressors of war, the particular technological features of each war and the health concerns of the day, and are often named accordingly.
- They are neither physical nor psychological, but somewhere in between

CONCLUSIONS

- There is a significant and substantial health effect of service in the Gulf War that involves UK servicemen and women
- It is associated with changes in morbidity
- There is no current evidence of any change in mortality, with exception of accidents/suicide
- Psychological factors are relevant, but PTSD is not the answer.
- Immunological changes can be found many years after the conflict
- We regard it as highly unlikely there is a single syndrome to explain ill health
- We regard it as highly unlikely there is a single cause to explain ill health

- In conclusion, we note that any proposed causative factor (s) must take account of the epidemiology – a common effect across all three Armed Services, and a common effect across all military roles and occupations (not just Teeth arms). This limits the number of possible culprits.

IMPLICATIONS FOR THE FUTURE

- Don't throw away records

- Better risk communication of health protective measures

- As there is little evidence that individual vaccines are associated with long term side effects, but the association is context dependent, the conclusion is that routine vaccination is preferable to hasty "on the spot" measures

- Post deployment syndromes are likely to continue

- Consent for follow up needs to be obtained on separation (Data Protection Act issues)

- Research is part of duty of care and risk management -- do it early

- The importance of trust and communication cannot be overstated

- Gulf veterans will continue to require health surveillance and monitoring for the forseeable future

OUR THANKS

- Our own funding finishes in September 2002, so we would like to take this opportunity to record our warm appreciation of all those who helped us in our work.

- We cannot thank enough the many thousands of UK servicemen and women, past and present, who have co operated in our studies.
- We particularly thank those who spent up to two days taking part in tedious studies at King's, including those who were in good health, and gave of their time to help comrades less fortunate
- We thank all the Veteran's organisations for their assistance, and in particular the Royal British Legion, who have supported us from the beginning.
- Our studies have been generously, but not too generously, funded by the US DOD, US CDC, UK MOD and UK MRC. We are particularly grateful to the US DOD, who began to fund our programme at a time when Gulf War studies were not given the priority they are now.

WHO WE ARE

The Gulf War Illness Research Unit is part of the GKT School of Medicine at King's College London

Co Directors: Professor Anthony David, Professor Simon Wessely

Unit Staff: Catherine Unwin, Lisa Hull, Lydia Farrin, Kate Davies

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Epidemiology: Dr Matthew Hotopf

Genetics: Dr David Collier

History: Dr Edgar Jones

Immunology: Dr Ania Skowera, Dr Mark Peakman

Neurology and Neurophysiology: Dr Michael Rose, Dr Mohammed Sharief, Ms Julie Pridden

Neuropsychology: Professor Til Wykes

Psychiatry: Dr Khalida Ismail

Statistics: Professor Brian Everitt, Dr Paul Seed, Mr Vasilis Nikolaou

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Dr S Cohn, Ms Claire Dyson (Goldsmith's)

Dr B Mackness, Dr M Mackness, Prof P Durrington (Manchester)

WHAT WE HAVE PUBLISHED

PUBLICATIONS LIST; King's College Gulf War Illness Research Unit May 2002

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Sharief M, Pridden J, Seed P, A, Rose M, Sharief M, Unwin C, Hull L, Sherwood R, David A, Wessely S. Neurophysiological evaluation of neuromuscular symptoms in UK Gulf War veterans. An epidemiologic, blinded controlled study. Submitted

Skowera A, Hotopf M, Sawicka E, Varela-Calvino R, Unwin C, Hull L, Nikolaou V,Ismail K, David A, Wessely S, Peakman M. Abnormal Th 1 Th 2 balance in Gulf War Illness. Sub

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IN PREPARATION (STAGE 1 AND STAGE 2 ONLY)

The effect of biological warfare vaccines on the development of Th1 and Th2 lymphocytes (Peakman et al)

Validation of a quantitative measure of muscle fatigue (Cowman, Rose, Wessely, Unwin)

Muir P, Unwin C, Hull L, Peakman M. Lack of detection of lymphocytic herpesvirus DNA in plasma of UK Gulf war veterans and controls.

Gulf war related illness; the role of past medical and psychological history (Ismail, Farrin, Hull, Davies, Unwin, Wessely, David)

Self reported chronic pain in UK Gulf war veterans (Thomas, Wessely, Hull, Unwin, David, Lewis)

Post Combat Syndromes: their relationship to training, unit and battle exposure (Jones, Hyams, Palmer).

Does premorbid IQ predict the development of PTSD? (Farrin, Hull, Wykes, Unwin, & David)

The health experiences and views of UK Gulf War Veterans (Cohn, Kilshaw, Wessely)

Health Concerns of UK Gulf War Veterans (Palmer, Unwin, Ismail, Davies, Hull, Wessely)

Muscle strength and endurance in UK Gulf War Veterans. Rose M, Priddin J, Spellman A, Seed P, Sharief M, Unwin C, Hull L, Wessely S

STAGE 3 EXPECTED OUTPUTS

Papers on prognosis of Gulf related illness, outcome of Bosnia service, predictors of remission/relapse in both cohorts, recall bias and memory of military exposures, influence of health beliefs on outcome, influence of military exposures on outcome etc.

The Health of Peacekeepers: United Kingdom Servicemen and Women serving in Bosnia (Hotopf, Blatchley, Unwin, Hull, David, Ismail, Wessely).

Papers on outcome of UK veterans comparing leavers and non leavers.

Qualitative studies on Gulf War veteran's narratives, illness views etc.

HISTORICAL STUDIES

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Wessely S, Hyams K, Bartholomew R. The Psychological Effects of Biological and Chemical Warfare. BMJ 2001: 323: 878-879.

Mr. SANDERS. You effectively agree with what he said?

Professor WESSELY. Yes, that is only an association. We have done that in the laboratory and Graham has given some hints on that and we partially confirmed some of the hypothesis. That is also under review in the journal but as Graham has already mentioned it I can mention it again. we have had replication of the hypothesis. I do not think it can be now as time has passed.

We have also done in collaboration with Dr. Mackness, we have sent him all our examples. He has done analyses there. Again, it is under review. By using collaborators we found something interesting and we are now in the middle of further analyses of data, doing follow-up studies to see what has happened to people over time. The trend is looking slightly more encouraging but there is still a difference between the Gulf and Bosnia.

In the one minute I have left I would like to pay tribute to a couple of things: To the veterans who took part in the study, there were 12,000 and the difficulty was trying to find them but once we found them, the amount of cooperation was remarkable. We are grateful to the veterans who came up to King's for the study and the key group there was not the sick ones but the well ones. They gave two days of their time, we did not pay them and we didn't half mess them around for altruistic reasons. I would like to thank also, we have had funding from the DoD originally; also I would like to thank the MoD in the UK, we have had cooperation from the MoD and I would like to thank the officials there I have worked with over the years. So, I would like to place on record our thanks to them as well. That is where I will conclude. I am sorry I do not have a presentation.

Mr. SHAYS. Professor, we appreciate you coming. You flew in?

Professor WESSELY. Yes, just got in.

Mr. SHAYS. So you have hardly had a chance to take a breath. You have before you Congressman Bernie Sanders, Congressman Adam Putnam and Lord Morris. My name is Christopher Shays and we will all ask you questions; we will start with Mr. Sanders.

Mr. SANDERS. Mr. Shays and I suffer from this syndrome: We have been to many, many meetings and heard from many, many government officials who have studied this year on year. So, we have a unique syndrome of listening to this. I don't know when you came in but you had five people up here who in various ways have told us that organophosphates and DU, without any doubt in their minds at least, causes very serious, not mental but physical effects on people. We have people in the US who have come to that same conclusion.

One of the problems that I have when I hear from government-funded people is they are still studying this and you have other people now documenting and demonstrating the actual damage done by assaults of organophosphates and DU. They seem to be twelve years ahead. So let me start off with the easy question that is:

If these people are making demonstrations that they are showing us on a screen of various brain scans, actual damage done, why is the British government, you think, not funding those people?

Professor WESSELY. I don't represent the government, Congressman. I have absolutely no idea. I can't answer that. I can say our work is collaborated with Rook and Mackness who I saw at the end of the list. So, we have been collaborating with scientists. As for other questions, I can tell you I have got money and I have failed to get money. We got turned down and we originally were turned down with Graham for the new application. Some grants we had and some we had not, but I don't think I can answer why others did not.

Mr. SANDERS. In your opinion is the British government funding the most significant research that may help explain the Gulf War syndrome?

Professor WESSELY. Any scientist is going to say yes. I have run out of money now and I am on record as saying I am disappointed with this. I think we should have taken a more long-term strategic approach, much better monitoring of our soldiers past and present and there is much more work to be done. I would also say it does not matter how much money you throw at us and I would like more thrown at me, but we need time to get to the position to test the hypothesis, to test Dr. Rook's hypothesis and to test Dr. Jamal's hypothesis. It takes time to recruit sick and well veterans. It took us two years to find these people. It is not easy and to find representative samples. You could have given ten times the amount you gave us but it would not really have been enough to get genuine clinical representative samples, there is not a real short cut to that.

Mr. SANDERS. In your particular judgment, is exposure to organophosphates and DU and the various vaccines and anti-nerve agents given to the soldiers one of the causes of Gulf War syndrome?

Professor WESSELY. I can speak to the work we have done. It is convincing that the particular schedule in multi-vaccines has been associated with Gulf War illness. We never looked at DU so I don't know.

Mr. SANDERS. Has there been any government-funded study that has looked at DU?

Professor WESSELY. I can't answer that, I don't know.

Mr. SANDERS. The answer is no?

Professor WESSELY. No.

Mr. SANDERS. After 11 years there is none?

Professor WESSELY. Again, it is very difficult to know who is exposed to what. We use the same techniques as Dr. Jamal so we have done that. To explain the large health effect we found, it has to be quite wide spread which is why we are interested in vaccines which are given to most of the groups rather than DU which it is hard to explain why that would have affected Admirals in the Navy so we prepared the hypothesis around mental and psychological factors as well. They would have affected large numbers of people across the entire performance which is what the epidemiological tests showed. If you look at battle fatigue, that was particularly mentioned in relation to World War II and people remained affected by that for many, many years, indeed their entire lives.

If you send men to war there is no such thing as a 'free lunch' and people have always been damaged by war and there are changes. We see things in the Gulf but things that are common to the experience of war—

Mr. SANDERS. 'They are neither physical nor psychological but somewhere in between'?

Professor WESSELY. Well, I think I am doing what we do which is a slight bit of spin. If you look at the First World War records you find—

Mr. SANDERS. Is there something in between physical and psychological?

Professor WESSELY. I think I am trying to say the end stages look quite similar. You can find stages in the First World War which sound like Gulf War syndrome, but they could not have been exposed to what they were exposed to in the Gulf War; but you find extremely moving descriptions which sound like what we are hearing as well.

Mr. SANDERS. You say:

"As there is little evidence that individual vaccines are associated with long-terms side effects, but the association is context dependent, the conclusion is that routine vaccination is preferable to, say, 'on the spot' measures."

Professor WESSELY. That would be a political interpretation you have put on what I said—

Mr. SANDERS. It was in the context of being given a lot of vaccines in a short space of time and the hypothesis of the high stress situation. If you think those vaccines are important, then clearly you should be giving them on a more routine basis, not in the heat of the day. The results of what Dr. Rook identified are the results of taking too many different vaccines in too short a period of time or too many of the same vaccines; if two is good, four is better while the bombs are falling?

Professor WESSELY. It is difficult to come up with that very fine plain analysis but in general the pattern we found which was indeed as Graham predicted, it was a small number of vaccines rather than the nature of the individual vaccine but it is difficult to be serious about that.

Mr. SANDERS. You did not identify how many of each person?

Professor WESSELY. Yes, we did. Where we had records we did.

Mr. SANDERS. What was the range?

Professor WESSELY. It was from 1 to 10 I think.

Mr. SANDERS. The future implication, not just the field application or civil applications we are talking about mass vaccinations and inoculations?

Professor WESSELY. I would be very careful not to do that. I am a very pro vaccination person and it is the particular circumstances of the Gulf War. In relation to civil policy I don't have any, to be frank. I can only look at what we have in front of us.

Mr. SANDERS. The prophylaxis said between the UK and US was different?

Professor WESSELY. Yes.

Mr. SANDERS. Is there any research out there that demonstrates the impacts the different schedules have?

Professor WESSELY. I think the only person who has looked at that is Steel. I think you knew far more, we were pretty bad with the records. You will know more about this than me but I understand there is no contemporary fact database. I may be wrong on that but that is what I think is the case. You talk about everyone has to agree that record-keeping was very poor.

Mr. SANDERS. What does "Neurological studies do not suggest major deficits" mean?

Professor WESSELY. We did a complicated neurological test looking at memory retention and so forth and those findings were generally normal. There were some changes that tended to be related to mood but we did not find evidence of strong neurological deficit.

Mr. SHAYS. Thank you. Lord Morris?

Lord MORRIS. Time is at a premium now so I must be brief. You heard me earlier refer to the incidences of Italian peace-keepers in Bosnia and finding there the true cancer costs?

Professor WESSELY. So I heard.

Lord MORRIS. I know that you are very familiar with what has been done from Britain vis a vis Gulf War veterans. There is concern that there is to be no reported intention now of a study of cancer in people who served in the Balkans. Could you comment on that?

Professor WESSELY. We are cooperating with the McFarlane Group and Hygiene group looking at cancer in the color format. We would like to look at cancer in the Bosnian veterans and it is no secret that I think that could be studied and I believe that members of the Armed Forces should have particularly their mortality and cancer incidence routinely monitored. We are in a good position to do that because we have good epidemiological bases and cancer bases that cover the whole of the UK. I think we should be routinely looking at those databases.

Mr. SHAYS. Mr. Perot?

Mr. PEROT. Have you had a chance to present these findings to the Prime Minister?

Professor WESSELY. No, not normally.

Mr. PEROT. Is your specialty psychiatry?

Professor WESSELY. Psychiatry and epidemiology.

Mr. PEROT. How much money in your research have you received from Great Britain?

Professor WESSELY. In Great Britain we received a grant from the MoD to study the epidemiology and from the Medical Research Council to study the outcome of the Gulf War report and that is what we have received.

Mr. PEROT. How much have you received?

Professor WESSELY. We received £300,000 for neurology and about £140,000 for the follow-up study. We failed to get other monies.

Mr. PEROT. When did you start going to the government?

Professor WESSELY. We went in 1996 and at that time they were not very keen on funding these kind of studies. Then we went to the MoD and most of it is paid for by you and that cost you $100,000 and I think that is very good value, but there we go. Then we went back to look at a similar epidemiological study also funded by DoD and that cost around $300,000.

Mr. PEROT. Who were you dealing with in the US?

Professor WESSELY. Oh dear. That's a good question. It would have been, you are going to have to help me on this one.

Mr. PEROT. Boston?

Professor WESSELY. I know who he is but on the individual level we never really saw them. Nicholls' name I recall, Simon Checks but we were over here. It was a rather faceless process.

Mr. PEROT. Is that funding still coming?

Professor WESSELY. No.

Mr. PEROT. Roughly when did that stop?

Professor WESSELY. The last of funding we had was probably two years ago.

Mr. PEROT. Can you talk about World War I? You are not aware of the chemical weapons involved in World War I?

Professor WESSELY. Indeed. I am afraid I should have said as well DoD also funded that historical study. We made a historical database at the time; we are very, very aware that chemical warfare was not invented by Saddam Hussein. You spend time reading the records from World War I. Not to be moved by them, means you have no heart at all. They are remarkable stories told in a familiar, amazing language.

Mr. SHAYS. I have a few questions. I want to make sure I have not misunderstood you. You said you found Gulf War illness?

Professor WESSELY. We have not found a Gulf War syndrome which would be a particular combination of scientific symptoms associated with the Gulf. We found the same pattern of symptoms as possible, the difference being the Gulf people. They had more of them, were more intense.

Mr. SHAYS. So, it is not your testimony you did not find Gulf War illness. Do you believe that a disproportionate number of Gulf War veterans be they from the UK or from the US came home sick?

Professor WESSELY. I don't have to believe it. Our evidence shows clearly for the UK that that is the case. There has been a significant increase in ill-health with Gulf War veterans which must be due to serving in the Gulf because they did not occur to those who served in the Balkans.

Mr. SHAYS. So you are not taking the position because you did not find something that something does not exist?

Professor WESSELY. That's true. We did not find a unique syndrome but I think it is a bi of an academic sideline. The important thing is we found an important health situation.

Mr. SHAYS. When I look at this research you have to know what you are looking for. When you go into that room you have to make sure you went into the right room and you have to make sure that you actually opened the door and looked in. If someone does a study and says, 'We did not find a problem or did not find this or that' it does not mean it does not exist. It may mean they did not know what they were looking for or they did not go in?

Professor WESSELY. We looked at all the doors, we went in and what we found what was behind them.

Mr. SHAYS. In looking at the relationship of organophosphates and Gulf War illness, most DoD and MoD studies did not attempt to measure nerve gas in organophosphates. This is my question: In your survey did you attempt to ask questions about organophosphates?

Professor WESSELY. Yes.

Mr. SHAYS. If yes, what are your findings?

Professor WESSELY. In terms of the reporting, people who reported exposed to nerve gas we asked were those with organophosphates more likely to be ill. The problem with that as a statement is it is not very informative. They were sick, they remembered more of everything which is why I put more emphasis on the immunological data and vaccine data where we had independent verification. On the organophosphates, we found people exposed to organophosphates but to be honest most people commonly did not know. We asked about the DU. The commonest response was 'I haven't a clue.'

Mr. SHAYS. In one of your earlier published papers you concluded . . . resulted in so-called post war syndrome, described by different medical changing terms?

Professor WESSELY. Yes.

Mr. SHAYS. For example, if this had been in Vietnam Agent Orange and that was probably only particular to Vietnam, would you agree various post war syndromes might be due to different causes?

Professor WESSELY. Absolutely. That is the point we are making. This is a classic example. Agent Orange and Gulf War veterans are very similar in their symptoms as I am sure you know.

Mr. SHAYS. What about your conclusions on so-called stress. Explain that to me.

Professor WESSELY. Again, it is not as you would say, rocket science, but clearly going to war is a stressful business and I can't believe in this day and age anybody denies that and some people will come back with visible wounds and some with invisible wounds.

Mr. SHAYS. But stress can change your biological make-up?

Professor WESSELY. Of course, yes.

Mr. SHAYS. And stress can perhaps let certain things penetrate your body?

Professor WESSELY. It can indeed. Just to reiterate what I have said, we looked at that and the classic symptom is PTSD. That does not account for the rates of disability in sick UK Gulf War veterans. It has increased, but not by very much, nothing like enough for the explanation of what we found.

Mr. SHAYS. When people imagine PTSD, they judge that like judging the unified symptom and it could be a whole host of things caused by a whole host of different causes.

Professor WESSELY. Well, actually I agree with you completely and in much broader terms than we intend to use it but I said if we use it in the way the US are using it in diagnostic manuals, that is not the explanation. Funnily enough I am on your side but PTSD is mentioned. We have found that to be increased which you would expect but not by very much. 1-3 percent.

Mr. SHAYS. It has been pretty well established that the epidemiological research allies with case definition. I think of it how Dr. Haley made some pretty great discoveries using the case definition when you compared the sick veterans from the well. It seems that that would confound the results. Is it true you avoided a case definition and if so, why?

Professor WESSELY. I have not avoided a case definition because we did not have one. We started out in 1995 where we had patients having very different things. There was nothing agreed as to what was the Gulf War problem, was it a psychological problem. So we first of all we went very broad indeed and then we decided where are you most likely to find the problems and we decided where people who had physical disabilities and the second case was the physical disability two standard deviations below, which was Bosnia and Kosovo. We looked at those where you are likely-to continue your analogy-we looked behind the door, where we were likely to find it which was the physically disabled.

Mr. SHAYS. It strikes me one of the most difficult things for you to develop your theory, why it happened and then you test it and find your theories wrong. You learn as much by learning it is wrong as if it is right. Then you go in a different direction. What I found with Mr. Haley's work and some of the people here, they might have been locked into a better theory of what might have occurred but they have deemed to not get the funding so we as a Committee are struggling with the fact that some of the people in our country we think it has all been vetted in a certain area and ignored certain elements we saw on the table before us. Your work should have been done but in addition the work of these men should have been done in our opinion and it would have given a better complement to sort out, a better view.

Mr. SANDERS. Let me pick up on the point. I don't mean to be rude, Professor Wessely—

Professor WESSELY. That usually means you are about to be rude.

Mr. SANDERS. You weren't here today when we heard from the veterans. They are angry, frustrated; they believe your government has not been responsive to their pain and that is what the veterans are saying exactly about the US government. One of the frustrations that they have in the US is that we have spent several hundred million dollars on studies and on studies and on studies and they go nowhere. What these guys want to know is what is causing their illness and how we can treat their illness. Having said that I regard that leading us in the wrong direction when you say the symptoms are neither physical nor psychological but somewhere in between.

We have five prominent scientists who were here a moment ago telling us that they are physical, that exposure to the DU, organophosphates, exposure to a variety of vaccines including vaccines with PB, that this is nothing to do with psychology and I don't argue with you that stress affects everybody in war. If a guy gets hit over the head with a hammer, we are not talking about a psychological—

Mr. SHAYS. You might have—

Mr. SANDERS. But the results are quite physical in his body and have to be treated in a physical way and I think when you write they are neither physical nor psychological, what you are doing is saying the evidence we heard here for an hour is irrelevant and when you say that, veterans are going to get very, very angry.

Professor WESSELY. First of all, I have not said that.

Mr. SANDERS. I read you the exact quote—

Professor WESSELY. I said they are physical and psychological.

Mr. SANDERS. "They are neither physical nor psychological but somewhere in between."

Professor WESSELY. I have said that I believe this is a complex story with many strands to it. I have said you cannot send men to war and not expect psychological problems but I have also said we made a substantial contribution to the answering of the points you made, to the work we have done with Mackness and Rook. You have to take what we have done by what we have done. We have taken a large view and I am closely allied to the people you were listening to an hour ago. You take us as you find us, Congressman. We are there on the record with the literature and I take some pride in what we have done to develop and understand Gulf War illness and we have collaborated with scientists and you have heard about them an hour ago. It is the same people, Congressman.

Mr. SANDERS. If I might conclude, the war has been over for 11 years. The truth of the matter is that the amount of research and understanding and treatment that has been developed despite hundreds of millions of dollars have yielded relatively little. If you compare that to AIDS research and treatment you would find Gulf War treatment sorely neglected. So, I say we should not be proud of government's role and we have a lot of work to do and I just wanted to get that out.

Mr. SHAYS. You did. The problem we have is we think it has been a story of failure of government to deal with the issue.

Professor WESSELY. I agree with you. We went to the UK government in 1995 or 1996 and we were told to, as the last speaker said, to 'Sod off'. So, I am completely au fait with that and repeatedly on record as saying I do not think handling veter-

ans now, I don't think we have a very good record in this country of looking after the veteran community. I have said that on many occasions as Lord Morris will confirm.

Mr. SHAYS. Mr. Putnam, do you have any questions?

Mr. PUTNAM. A gentleman from Vermont made my point very eloquently. We have already heard your statement that the historical studies reflect the syndrome is neither physical nor psychological but somewhere in between. That is not acceptable to our veterans, it is not acceptable to those who are overseas now being exposed to the same risks they were exposed to years ago. While you did clearly say that PTSD is not the cause, most of this discussion has focussed on the psychiatric rather than the physical and it is the physical that causes people's livers to shut down and intestinal and endocrine systems to shut down and reproductive health to be destroyed, so in that regard I would agree with everything Mr. Sanders said which is we have a long way to go and we learned more in the previous panel of entrepreneurial researchers.

Mr. SHAYS. We are delighted to have a point or two if you want to put anything on the record.

Professor WESSELY. Well, I think the points have been made but I believe it is a complex disorder. It is like a large jigsaw. I have the people round the table put some pieces in that jigsaw but there are large areas that remain dark and I am as committed as anyone else is and you are preaching to the converted on that one.

Mr. SHAYS. We thank you for your work, where your heart is as well as all the other people here before. We collectively are in this together to make a big difference and we look forward to making a difference.

I would like to say, Lord Morris, this has been a unique experience to be your guest in this magnificent chamber and to be in my forefathers' home country and I would like to present you with a gavel we have used in our hearings for a number of years and I am going to part with it because it has a home with you.

[Applause.]

Lord MORRIS. I shall treasure this gavel. I promise not to use it too frequently for purposes other than those for which it was made.

Can I in turn pay very high tribute to our American guests. I think Christopher, as Mark Twain, who if he did not ought to have said when he was asked about Wagner's music. He said "Wagner's music is not as bad as it sounds."

[Laughter.]

Lord MORRIS. Christopher, because of your work and your fellow Congressmen and that of Ross Perot whom we all admire and those who have been working behind the scenes with you, this occasion has been far more successful than any of us could possibly have hoped. If I can say so, the Royal British Legion has been very much involved in our affairs. What we have achieved here today and yesterday and hope to achieve tomorrow, could not even have been contemplated but for the support of the Royal British Legion.

I pay a tribute to Terry English, to Lorna Rudkins, to Jeremy, to others here today from the Legion. All of us look forward to being their hosts later today. We are deeply grateful, Terry. Please accept that on our behalf.

Again, Chris, can I thank you very much for inviting us. I think we have done a service to everyone involved. I say tomorrow in the Royal Robing Room. We are not saying that people in executive government here or in the US want to see stricken veterans and disadvantaged. What we are saying is their problems are our problems. They are the problems they should not be bearing, the costs of the Gulf War but I thank everyone who has helped in any way in the making of what for me has been a very memorable experience.

Mr. SHAYS. Thank you very much. I don't have a gavel to close. Can you use the gavel?

[Gavel by Lord Morris.]

[Whereupon, at 4:28 p.m., the hearing was adjourned.]

[Conclusion of transcript insert from July 18, 2002.]

Mr. SHAYS. At this time the chairman would recognize the most distinguished and articulate vice chairman of this subcommittee.

Mr. PUTNAM. Thank you, Mr. Chairman. I continue to be appreciative of your work and Mr. Sanders' work in this field. I came late to this cause and have been proud to participate in it, having had a number of constituents impacted by it.

The lessons we learned in London were tremendous and I sincerely hope that our Pentagon and our Defense Department apply the lessons of the last war to the pending one.

Mr. SHAYS. I thank the gentleman.

I would also say that it was an extraordinary privilege for you and Mr. Sanders and myself to address members of the House of Lords and the House of Commons during our 2-day experience in London.

We would also note for the record that we have the most distinguished chairman of the International Relations Committee, Mr. Ben Gilman, and unless he has something to say, I am prepared to adjourn this hearing. [Laughter.]

Mr. GILMAN. Looks like I came at the right time.

Mr. SHAYS. I do have one order of business.

I ask unanimous consent that all members of the subcommittee be permitted to place opening statements in the record, and that the record remain open for 3 days for that purpose. Without objection, so ordered.

I ask further unanimous consent that all witnesses be permitted to include their written statements in the record. Without objection, so ordered.

Any comments that the most distinguished gentleman from New York would like to make?

Mr. GILMAN. No, I just want to commend you once again for your great work in making certain that we follow all of the needs of our personnel overseas and our military personnel. I am very distressed to read in the morning papers about the testing of nerve gas in some of our areas, and I hope our chairman will take a look at all of that.

Mr. SHAYS. We definitely will.

Mr. GILMAN. Thank you, Mr. Chairman.

Mr. SHAYS. Thank you.

If there is nothing further, we will now adjourn this session.

[Whereupon, at 9:42 a.m., the subcommittee was adjourned, to reconvene at the call of the Chair.]

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